

The AUTOMOBILE

Increasing Brake Efficiency; Proper Methods of Application

Locking the Wheels Detrimental to Tires—Gradual Retardation Gives the Best Results—Full Brake Power Seldom Required—Opinions of Factory Experts

Technical Phase of the Subject—Best of Materials Requisite—Study of Friction Coefficients—Arguments For and Against Metal and Fabric Facings—Results of the Tests

STOPPING a car without applying enough pressure on the brakes to lock the wheels is the most efficient braking method. It is also the cheapest to the owner—In official brake tests conducted during the past 3 years after long-distance reliability contests the best brakes have been those in which the rear wheels were not locked. In such cases the cars have been stopped in the shortest distances. In not a few of these tests where a contestant has been given two successive trials better results have been obtained in the second trial by momentarily releasing the brake after the wheel was locked and then applying it again than were obtained in the first trial, where the wheel was locked from the second of brake application.

In all of these brake trials with cars traveling at 20 and 18 miles per hour when crossing the line at which the brakes had to be applied, the two rear wheels were locked and skidded towards the curb, so that when the car finally stopped it was at an angle of 45 degrees across the street. Such conditions have happened on dry asphalt pavement and also on some types of bitumen road surfaces.

Practically all of these brake tests called for stopping the car within a distance of 50 feet without penalization, and a penalty of one point per foot was imposed for every foot over the 50 required in stopping. In these tests many drivers were able to skid the wheels for 20 or 30 feet before crossing the 50-foot line, but still were compelled to take a penalty of a point or more, whereas others who did not lock the wheels stopped in distances of 28 to 40 feet.

These examples proved conclusively that locking the wheel is not enough; the brake must do more. The brake designer must keep this in mind in designing his braking arrangements; the manufacturer of brake facing materials must also keep it in mind and the driver must realize that he is not getting the maximum efficiency out of his brakes when he merely locks the wheels and permits the car to skid wherever it may.

When the wheels are locked the tire has to slide instead of roll over the road surface, and the actual possible retarding power of the tire is discounted in that one small portion of the tire surface does the work and it invariably becomes quickly glazed by dust or other matter accumulated from the street during the slipping or skidding, and which matter reduces the adhesion between the tire and the street surface. As already stated, better results and shorter stops have been made by momentarily releasing the brake after a short skid due to a new portion of the tire tread being brought into use, this portion not being glazed at the moment of application.

Where a brake is designed to give gradual retardation instead of the instantaneous lock this factor is eliminated and the entire circumference of the tire is brought in contact with the road surface, there is not an opportunity for the glazing, with the consequent result of a quicker stop.

Automobile owners are constantly asking for the distance in which the car should stop from the moment of brake application. It is impossible to answer this question. The answer

RESULTS OF OFFICIAL BRAKE TESTS, WITH CAR
TRAVELING AT 20 MILES AN HOUR

Car weight	Service brake	Emergency brake
3,740 pounds	32 feet	30 feet
3,900 "	33 "	33 "
3,750 "	36 "	30 "
4,280 "	55 "	22 "
4,090 "	45 "	40 "
3,790 "	38 "	68 "
4,260 "	97 "	39 "
6,030 "	27 "	35 "
3,750 "	23 "	28 "
3,340 "	31 "	28 "
3,450 "	29 "	49 "
3,620 "	39 "	53 "
3,490 "	61 "	46 "
3,830 "	31 "	30 "
4,010 "	63 "	40 "

depends on the surface materials of the road, on the moisture element in the surface, on the car brakes, the car weight and the method of application. Some accurate figures are given herewith, these being taken from official tests with the car traveling at 20 miles per hour with two passengers and full equipment on. These distances range from 27 to 97 feet. In order to make the facts more valuable the car weights are given. In each case the tests were on level asphalt and the speeds full 20 miles. One set of brakes was applied at a time, the service or foot brakes first and the emergency or lever brakes second. It must be borne in mind that these tests were made after approximately 1,000 miles of road use with full load and at an average speed of 20 miles per hour schedule.

The figures show that a good brake should stop a car within 35 feet, one set used only. Brake engineers differ on this subject. "We believe that when the average car is traveling on smooth asphalt the brakes should be so constructed and so lined as to bring the car to a stop within 28 feet at 20 miles an hour, using both brakes at once," states J. R. Kelso, general manager of the Woven Steel Rubber Company.

Never Use Full Brake Power

Most brakes will readily fulfill these conditions when the cars leave the factory, but when the owner neglects the care of the brakes after the car is delivered to him, the efficiency rapidly falls off until he is suddenly made aware of existing conditions by the brakes failing him in an emergency where a quick stop is a necessity. A gradual stop is desirable; a sudden stop shortens the life of the brakes and tires. To use the brakes only when necessary is an excellent practice.

In descending a steep hill let the motor be the brake. Throw the gearset into second or third speed if the hill is very steep. Switch off the ignition and let in the clutch. The car will be practically driving an air compressor, saving the brakes and cooling off the motor. Near the bottom of the hill turn on the switch. In most cases it will be unnecessary to touch the brakes.

Before looking at the brake problem from the manufacturer's standpoint a few points of vital interest to the owner may be touched upon. The car should never be voluntarily driven into such a position where a sudden stop by the use of the utmost possible braking power is necessary. The brake lining will be rapidly worn away if this is done, necessitating an adjustment of the brake at frequent intervals. In hilly country brakes will require an adjustment after from 600 to 800 miles' use on an average car, while in level country they will only need regulating after between 3,000 and 4,000 miles of travel.

The figures apply to fabric-lined brakes, but with metal-faced types only a few users of such claim 15,000 miles' service in hilly countries without an adjustment. This freedom from adjustment is advanced by them as the strongest argument for the metal facing. While advancing these figures they also admit that the friction qualities of the metal are not equal to those of the fabric composition, and also that the brake is not so quiet in operation. There are others who use both metal and friction facings, metal on one set and friction on the other, the use of two materials being due to the different qualities of them, and so providing the driver with a higher safety factor than were a single material used. Some strike a half-way mark, using metal and fabric on the same brake, using soft iron segments with short segments of fabric between them, the iron being inserted to prevent the brake from glazing, and so giving a more efficient brake construction.

"A good brake lining must have four qualifications," says G. W. Dunham, consulting engineer of the Chalmers Motor Company. "First, it must be thoroughly heat-resisting; second, able to stand rough usage with a minimum amount of wear; third, it

must not grab, and fourth, it must be silent in action." This statement is typical of the requirements of the manufacturer. According to the same authority, "If a brake fulfills these conditions it should hold the wheels just short of skidding which will give a stop in a minimum distance considering the weight of the car, the load carried and the conditions of the road. Any of the brakes provided on the cars of today are sufficient to lock the wheels, but the desirable feature, aside from stopping the wheels under all conditions is to allow them to turn very slowly."

There are two ways of stopping a car. One is by locking the wheels and skidding and the other is by allowing the wheels to turn and interposing the resistance on the brake drums requiring the momentum of the car to overcome the resistance there instead of expending its force in sliding the tires over the road surface. The first method wears tires and the second wears the brake material. Brake fabric is cheaper than tires and the answer to the question as to which is the best way to stop a car seems obvious.

Taking the testimony of the experts employed in the largest motor car manufacturing plants the conclusion which is reached immediately is that the most efficient stop is made when the force exerted on the wheels is just below the point where locking takes place and a skidding stop is made. The wheels are allowed to roll over the ground and a smooth silent stop is made. Putting the tire casing against a swiftly revolving grindstone will scarcely destroy it more quickly than allowing it to slide over the gritty surface of a road, but a stop made by not skidding will be accomplished in less distance, will minimize the stresses on the tire fabric, reduce the tendency toward side slipping and be far easier on the wheel itself. These are the reasons advanced by the designers for their declaration as to the best way to stop a moving automobile and in the light of this it is interesting to note what the engineers are doing to provide a braking outfit that will act in such a way that an ideal stop is made.

The matter of designing the braking system of a car is up to two distinct parties: The first is the manufacturer of the brake material and the second is the car manufacturer who designs the system of application and what is just as important, the system of compensation for the wear that must occur in the fabric. The producer of the brake material must bring out an article which will have above all a high coefficient of friction. As it is generally understood this coefficient is an expression showing the definite relation between the force required to just move a given load over a surface and the weight of that load. Where the pull required to move the load is P pounds and the weight is W pounds an expression involving the coefficient of friction f , would be $P = fW$. To illustrate: If a 10-pound pull were required to just move a load of 100 pounds weight over a given surface the equation would become $10 = f 100$. Solving, $f = .10$. In the case of the brake the load is the pressure applied by the driver, the coefficient of friction depends on the nature of the braking surface and the product of the two gives the pull as expressed above by P and this is the force that is exerted by the brakes in bringing the car to a stop.

High Friction Coefficient Necessary

The fabrics used for brake linings are composed to a large extent of asbestos fabric stranded with brass or copper wire which varies all the way, according to the claims of the makers and users from .25 to .90. Taking .60 as a probable average to further illustrate the meaning of the coefficient of friction as distinctly applied to the brakes of an automobile, the effect of the ordinary application of a brake will be noted:

When the driver presses his foot upon the pedal he sets in motion a system of levers and a cam on the brake which reduce the distance through which the different members of the system travel but which magnify the power to a large extent. Assuming for the moment that the pressure exerted upon the pedal results in a pressure of 1,000 pounds at the point of application of the brake to the drum, this will correspond to a load of 1,000 pounds pressing the brake fabric against the drum. The result-

ing friction will be the product of this load and the coefficient of friction, .60 making such product 600 pounds. This pressure is exerted at the rim of the brake drum which may be assumed to be a distance of 9 inches from the center of the axle and when referred to this point result in a stopping or retarding moment of 1,500 inch-pounds which is opposed to the moving car and which gradually brings it to rest.

It is evident then that the maker of the brake lining must make a high coefficient of friction an aim if he wishes his fabric to be a success, because where the coefficient of friction is low only a small percentage of the load applied to the brakes by the pressure of foot or hand is utilized in producing a stopping moment which after all is the final aim of any braking system.

Brake material must be able to resist the effects of a high temperature. There is a law of nature which says that no energy can be destroyed, it may change its form but it will never cease to exist. The energy which is stored up in a moving car must be dissipated gradually in bringing the car to rest and in doing this a large part of it is transformed into heat. The temperature at which most brakes are tested is at a dull red heat of iron. Other makers require that the material shall show no change of structure when submitted to a temperature of 800 degrees Fahrenheit. Should brake material char its integrity will be destroyed to such an extent that it will literally fall apart so that this heat-resisting quality is an absolute necessity. Some of the statements made by experts in the manufacture of brake linings may be repeated to show the importance in which temperature resisting qualities are held:

George D. Moore, president of the Standard Woven Fabric Company says: "The temperature which a brake lining should be capable of standing should be as high as a dull red heat. I have seen instances of brakes which have been run at temperatures quite as high as this."

I. A. Venters, speaking for the Johns-Manville Company declares that, "Any good surfacing material should be capable of withstanding a temperature of 800 degrees Fahrenheit."

Brake material must resist the effects of oil and water. If the material should absorb oil readily it would become useless in a short time because the coefficient of friction would be lowered to such an extent that it would be impossible to stop the car in a short enough distance. On the other hand it must not be so full of oil or other compounds that said oil or compound will run out when the band becomes extremely hot on account of the friction when the brake is applied. Oil is prone to work its way through the rear axle and out to the brake drums on many cars. Felt washers and packing boxes of various kinds have been used with success but after a time when wear has taken place the surface of the brakes is apt to acquire a slippery coating of lubricant which renders the brakes inefficient until they are washed off with gasoline. A renewal of the felt washers prevents the recurrence of a trouble of this nature.

Linings Must Be of Best Quality

The maker is exacting in his requirements of the brake lining manufacture because he is aware that, should it not possess ample wearing qualities, numerous replacements will be necessary. What the car maker requires is of great importance because it brings out better than anything else what the requirements of a good brake should be. An example of what automobile engineers consider as important in a brake may be mentioned: Speaking for the Pierce-Arrow Motor Car Company, D. Fergusson, chief engineer, has this to say: "The lining should not be compressible, otherwise the brakes will have to be frequently adjusted. Many brake linings require more taking up for this cause than for actual wear. They should not wear rapidly. The material should have sufficient tensile strength so as not to be torn away from its fastenings. The lining should be fireproof and if of metal should have a high melting point. The lining should be capable of being readily renewed. The punching of holes through it should not open up the seams."

"As a general proposition the brake capacity in all cars, both

American and foreign for use in this country is inadequate," says W. A. Drysdale, consulting engineer for the American Asbestos Company.

"It is our impression that the brake capacity of the average American car for extreme use is rather under than over the proper requirements," says George D. Moore, president of the Standard Woven Fabric Company.

"The braking capacity of the average car is either not up to the standard, or else the average driver is very lax in the care of his brake," states I. A. Venters, of the Johns-Manville Company.

"We think that while many cars in the past had insufficient braking capacity, that the present tendency is to correct this trouble," says J. R. Kelso, general manager of the Woven Steel Hose & Rubber Company.

Speaking again, D. Ferguson says, "If the brake drum diameters are too large, the chances of locking the wheels are very great with even a moderate pressure applied to the levers. The proportion of leverage and brake drum diameter should be such that it requires considerable effort to lock the wheels, otherwise the tires will not last long."

There is a point evidently where these two extremes meet to produce the brake that will give the efficient stop noted before. It is the office of the maker of the brake material whether it be a copper or brass-asbestos fabric or a metal, to produce something which will meet the frictional requirements, have a high heat-resisting capacity, good conductivity, long-wearing qualities, good tensile strength, easily removed and renewed, silence in action, it must not grab, it must not absorb oil or water and it must be incompressible.

The car manufacturers must produce a system by which a gradual pressure can be put upon the brakes, the drum areas must be correct, the fabric must be ordered thick enough, the brakes must be readily adjustable with adjusting points above all accessible, the brakes must not be allowed to drag, it must be easy to get at the brakes to reline them and the drums must be of such material that they will not wear.

French Automobile Exports Gain

Paris, July 26—An increase in exports of more than \$4,000,000, and a very slight increase in imports, with the United States still standing firm, are the outstanding features of the French automobile returns for the first six months of 1912. During the half year automobile imports rose to the sum of \$1,337,940, compared with \$1,316,940 for the same period of 1911.

The French national industry has every reason to be satisfied with volume of business done during the half year, for the actual increase, compared with the first six months of 1911, totals \$4,155,180. Increased business has been done with England, Belgium, Germany, Switzerland, United States, Brazil, Argentine Republic, and Algeria. The most important feature of the foreign trade is the great increase with Belgium. From \$2,747,640 in the first half of 1911, the volume of business has increased to \$4,330,320 during the current half year. Great Britain still stands at the head of the list as the most important customer of France, but the increased trade with her has been very slight, and the total with Belgium comes close to that with England. The following are the official figures of French automobile exports for the first six months of 1912:

	Half year 1912	Half year 1911
Great Britain	\$5,932,380	\$5,835,480
Belgium	4,330,320	2,747,640
Germany	1,687,920	1,308,240
Argentine Republic	1,515,800	899,400
Algeria	1,477,260	1,021,320
Brazil	987,120	675,120
Switzerland	540,840	441,480
United States	543,180	295,500
Italy	445,880	527,040
Spain	333,340	252,540
Russia	178,140	262,800
Austria	108,540	230,760
Turkey	85,740	237,240
Other countries	2,195,160	1,471,980
	\$20,361,720	\$16,206,540

Legal News of the Week

Details of Knight vs. Argyll Suit, in Which Court Decided That Latter Had Not Infringed

Agent Can Sell All Types of Horns—Hupmobile Representative Bankrupt—Wishart-Dayton Bankrupt

LONDON, July 26—Further particulars regarding the adverse decision in the litigation commenced by Charles Y. Knight and associates against the Society of Motor Manufacturers and Traders involving the alleged infringement of the Knight patent in the Argyll single-sleeve valve engine have come to public notice.

The plaintiffs, Charles Knight and Lyman B. Kilbourne, were the registered legal owners of letters patent dated July 15, 1905, and numbered 14,729, for an invention of internal combustion engines granted to the plaintiffs for the term of 14 years from the date thereof; and the complete specification of the letters patent was duly amended by an order of the Chief Examiner dated November 16, 1908. The plaintiffs alleged that the defendants had infringed their letters patent, and they claimed an injunction and the usual consequential relief.

The plaintiffs' engine was used in the Daimler cars, and they complained in particular of the exposure and offering for sale at the defendants' stand at the show held by the Society of Motor Manufacturers and Traders (Limited) at Olympia, on November 3, 1911, of a 25-horsepower engine fitted to a limousine car and described as the "Argyll single-sleeve valve engine." The defendants denied the alleged infringement and the validity of the plaintiffs' letters patent. They also set up the usual defenses of anticipation and want of novelty, and alleged that the invention was not useful.

The trial of the action occupied several days as reported in *The Times* of July 4, and at the conclusion of the evidence and arguments judgment was reserved.

Claims of the Inventor

Mr. Justice Neville, in the course of his judgment said, that to claim for the patent for this invention the title of a master patent was, he thought, extravagant. The inventors declared the primary object of their invention to be to provide an improved form of internal combustion engine in which the moving parts should be directly connected and positively acting and the use of poppet valves and springs avoided. They declared that the invention consisted in certain features of novelty in the construction, combination, and arrangement of parts, all as fully described and more particularly pointed out in the claims. They then enumerated the parts and declared that either the cylinder described or a member telescoped with it should be operatively connected with the piston, but so far the court had not been told which of those parts was to be moved, the invention being in effect declared to be compatible with the movement of either. They then proceeded to tell the court that in the exemplification of the invention shown in the drawings of the two telescoped parts the cylinder was the one to be moved.

His lordship thought as a matter of construction that the exemplification was an exemplification in which one of two alternatives was adopted, but that subject to that the succeeding parts of the specification describe the invention itself, and not merely one way of carrying it into effect.

The present case showed the great care which should be exercised in allowing amendments to the claims in a specification, particularly where there was no opposition. The comptroller was doubtless told, as his lordship had been told, that the alteration was merely a verbal one, but clearly it could not have

been intended to narrow the claim. It was, therefore, either wholly immaterial and should have been disallowed on that ground, or it must have been intended to widen the claim and was therefore illegal. In the result it had in the present action been relied upon in effect as altering a claim of an obviously limited character into one of the widest possible extent, and his lordship's conclusion was that upon the true construction of the specification the defendants had not infringed.

It appeared to his lordship that the action was a somewhat audacious attempt to resuscitate a patent for an invention of small compass and, to say the most of it, of very moderate utility, and by the help of an amendment to make it cover and embrace a wide field of enterprise in a comparatively modern type of mechanism, and so far as he was concerned the attempt failed and he dismissed the action with costs.

An appeal has been entered.

Hupmobile Agent Bankrupt

WASHINGTON, D. C., Aug. 6—An involuntary petition in bankruptcy was today filed against one Reed, the local agent for the Hupmobile. The Mutual Automobile Accessories Company, \$28; Crane Wagner, Incorporated, \$255, and Fox Stiefel & Company, \$725.83, were the petitioners. Reed opened his shop several months ago at 1218 Connecticut avenue, in the heart of the fashionable residence district and looked to have a bright future. L. C. Loving and T. C. Bradley, were appointed receivers under a bond of \$5,000.

The Diamond Rubber Company secured judgment against Reed for \$310 and the Lovell McConnell Manufacturing Company filed suit against him for \$230. Reed's total liabilities are about \$6,500 and his assets \$1,500.

Palmer & Singer to Appeal

According to Jay N. Emley, solicitor for the Palmer & Singer Manufacturing Company, a motion will be made in the United States District Court in the immediate future to vacate the order of Judge Hand providing for a decree *pro confesso* in the suit instituted last fall by the Enterprize Automobile Company for alleged infringement of the Dyer patents.

Mr. Emley asserts that the demurrer filed by him prior to the ruling of the court was not included in the presentation for decree *pro confesso* by the solicitors for the Enterprize Automobile Company, Dyer, Dyer & Taylor, and the latter hold that the various postponements and delays which have occurred from time to time did not contemplate the filing of any demurrer at all.

Can Sell All Types of Horns

PROVIDENCE, R. I., Aug. 5—Judge Brown of the United States District Court, for the District of Rhode Island, has denied the application of the Lovell-McConnell Manufacturing Company and others for an injunction to prevent the Waite Auto Supply Company from dealing in Newtone horns and from dealing in Klaxon and Klaxonet horns or from dealing in Newtone horns while at the same time dealing in Klaxon and Klaxonet horns.

Affidavits were presented on both sides and arguments were made from both points of view. J. Jerome Hahn, solicitor for the defendant company, moved that the application be denied and on July 29 the court held and ordered that the motion for injunction be denied. The main contentions will be tried out upon final hearing which will probably be had early in the Fall.

Must Appear in Court in Person

MALDEN, MASS., Aug. 5—Judge Bruce of the district court has read a lecture to the police of this city for assuming to tell motorists arrested for speeding that they could enter an appearance through their attorneys instead of appearing themselves and plead *nolo contendere*. The men so notified were ordered to appear before the judge so that he could hear what they had

to say, as he believes that in making them come into a court of justice the seriousness of their offense will be impressed upon them more forcibly and they may be more careful in future. That the judge if fair was shown by his disposition on a case last week when a motorist whose car swung off the road a few feet and ran on the grass of the parkway was arrested on a charge of reckless driving. The judge discharged the man and told the arresting officer that there was no ground for such a complaint, explaining that reckless driving meant speeding at a rate that endangered the lives of people.

Rose-Grossman Suit Nearing Trial

In the suit of Rose Manufacturing Company against Emil Grossman and others the plea made by Charles C. Gill, solicitor for the defendant, has been withdrawn and leave to file an answer on the September rule day has been granted. The suit involves the validity of the Neverout license plate holder patent held by the Rose company. The plea that had been entered by Mr. Gill was that the claims set out in the petition had already been adjudicated. This plea is now withdrawn and an answer to all the material allegations will be filed.

Receiver Appointed for Madison

BALTIMORE, MD., Aug. 5—A receiver has been appointed for the Madison Motor Car Company by Judge Dawkins in Circuit Court. The bill of complaint was filed by Pinckney L. Sothoron, who states that he is a stockholder of the company, having twenty-five shares at \$100 a share. The company consented to having J. Milton Lyell appointed receiver and permission was granted to the receiver to continue the business for 60 days.

Wishart-Dayton in Difficulties

Involuntary bankruptcy proceedings have been instituted in the United States District Court against the Wishart-Dayton Automobile Company which handled trucks in New York. The liabilities are estimated at \$10,000 and the assets at half that amount. Spencer E. Wishart, the well-known race driver, was formerly connected with the embarrassed concern.

Goodyear to Sell \$1,600,000 Stock

The Goodyear Tire and Rubber Company, of Akron, Ohio, is marketing the remainder of its authorized issue of \$5,000,000 of 7 per cent. cumulative preferred stock through Spencer Trask & Company, of New York. Delivery of the new certificates will begin after September 1, according to the brokers.

The total amount to be disposed of aggregates about \$1,600,000 and the market has stood above par for a long time on this issue. The circular issued by Spencer Trask & Company shows that 80 per cent. of the total output of the company consists of pneumatic tires and the estimated gross earnings for the fiscal year ending October 31, 1912, will be in the neighborhood of \$25,000,000 with net applicable to dividends of \$2,500,000. According to the balance sheet submitted in summarized form, the assets of the company amount to 200.6 per cent. on the preferred stock issue and 138.4 per cent. of quick assets.

THE following individual licenses have been granted by the Enterprize Automobile Company, authorizing the use of the Dyer transmission patents: To Joseph G. Fornecker, Sultan; Washington Garage, Sultan; William Scully, Sultan; Bruno Schultz, Rochet-Schneider; S. H. Bergs, Dragon; Jacob Hardtfelder, Allen-Kingston; Kelsey Smith, G. J. G.; Gustave Weyl, Cortland; Thomas Wilmarth, Mora; Thomas Callahan, Sultan; Andrew Lebrasseur, Mors; F. M. Rahill, G. J. G.; Melrose Garage, C. G. V.; Joseph Sperker, Sultan and William Whitman, Isotta.

Allen Brothers, American agents for the Metallurgique line, have taken out an importers license under the patents.

Willys Alleges Fraud

In Suit Against Officials of Gramm Company Avers They Voted Themselves Stock Illegally

Divided Surplus That Did Not Exist—Weed Chain Tire Grip Company Wins Two Suits

TOLEDO, O., Aug. 4—A sensational suit was this week filed in the common pleas court, by John N. Willys against A. L. White, president, and W. T. Agester, treasurer, of the Gramm Motor Truck Company, of Lima, O., asking the court to set aside a contract entered into last April on grounds of fraud. Mr. Willys alleges that on last April 15 he was induced by certain representations on the part of defendants, to enter into an agreement whereby he was to purchase 4,000 shares of the stock of the Gramm company at its par value. That he paid to defendants the sum of \$50,000 in cash and gave his promissory notes due one for \$75,000 on August 1, one for \$75,000 due on September 1, one for \$100,000 due on October 1, and one for \$100,000 due on November 1. He alleges that the notes and stock were deposited in the National Bank of Commerce, at Toledo, O., which is also made a party defendant. Willys claims that at a meeting of the stockholders of the Gramm company, held last September, and controlled by White and Agester, the company was authorized to deliver to the A. C. W. Realty Company 1,000 shares of stock, for a fictitious indebtedness, and caused the company to issue a delivery certificate, dated August 1, 1911, without receiving any compensation therefor. It is claimed that Ira B. Carns, a stockholder in the Gramm company, controls this concern. It is further alleged by Mr. Willys that at the same meeting a dividend of \$225,000 was declared payable in stock, and a division of stock was authorized when the company had no surplus capital. Shares were then distributed to the number of 750 to the A. W. C. Realty Company, 221 to A. L. White, 150 to W. T. Agester and 106 to I. B. Carns, making a total of 1,142 shares. Willys alleges that White and Agester then voted to themselves respectively 755 and 800 shares of the common stock of the concern, and that the whole amount of 4,000 shares was then sold to him at par. He states that the company had no surplus to divide but had lost large sums; that it had no legal right to any real estate, but that it occupied the plant under a contract to purchase the property, and that it is indebted in the sum of about \$135,000, none of which facts were made known to him at the time of purchase. He asks the court to grant the relief denied by defendants; that his notes be returned to him; that the contract be annulled; and that he may recover \$50,000 already paid.

Weed Company Wins Two Suits

Final decrees in the suits for infringement of the Parsons non-skid patent have been entered in the United States District Court against the Newhall company and the Seneca Chain Company on application of the Weed Chain Tire Grip Company.

The last step in these prosecutions was not contested and the decrees were by consent of the defendants.

RICHMOND, VA., Aug. 3—Among the 121 indictments returned by a grand jury in the Hustings Court against firms and corporations failing to pay State license taxes appear the following:

Jefferson Garage, E. H. and N. W. Christian, proprietors; Diamond Rubber Company, of New York, R. G. Dunn, manager; Ford Auto Company, R. F. Kochler, manager; Thomas Motor Sales Company, O. B. White, proprietor; United Rubber and Tire Company, F. B. Goodloe, manager.

Atlas Deal Declared Off

Everitt People Object to Flanders Using His Name in Connection With New Company

Studebaker Corporation Drops Names of E-M-F and Flanders—Will Use Own Name for All Models

CHICAGO, Aug. 3.—The deal between Normon W. Church, of Los Angeles, Cal., and Walter E. Flanders, of Detroit, in connection with the bid for the plant of the Atlas Engine Works, of Indianapolis, has been called off and following this announcement Mr. Church has told of the negotiations which, it was expected, would result in the purchase of the Atlas Engine Works and the occupation of the big factory of the Flanders Motor Car Company, which was to have been organized for the purpose of turning out a car to sell at \$1,000 or under.

"About May 1," said Mr. Church, "information reached me through banking interests that it would be possible to secure control of the Atlas plant. I knew the factory and its possibilities and I realized what a big thing it would be to get it and turn it into a factory for the production of cheap cars. I first of all talked to W. F. McGuire, then factory superintendent of the Ford Motor Company, of Detroit, and he, too, saw the opportunities. Then we determined to interest Walter E. Flanders, the three of us to swing the deal. Mr. Flanders was agreeable and we proceeded with our plans.

"We determined to use the Flanders prestige to the utmost and decided to call the new concern the Flanders Motor Car Company, Mr. Flanders having discovered that his Studebaker contract did not stop him using his name in other businesses. This was after he had gone into the Everitt deal. When he joined the latter combination he was under the impression that his hands were tied so far as using his name was concerned.

"Investigating affairs at the Atlas plant, we found that it would be necessary to put the concern through a friendly bankruptcy, which was done, and we were prepared to close the deal at the receiver's sale which was held last Monday. I was called from Los Angeles and when I got East I found that the Everitt people had raised an objection to Flanders using his name for the company I was forming, claiming that it was doing them an injustice and robbing them of prestige that should be theirs. The next angle was when they insisted that the entire Everitt company be taken into the Atlas deal. I refused and rather than see the affair go by the boards I offered to withdraw entirely with the financial backing I had, including Mr. McGuire, and leave the field to the Everitt people. This they refused to take up and as I would not let them into the original Church-McGuire-Flanders combination the deal whereby the Atlas plant was to have been sold last Monday fell through. Mr. Flanders and myself are no longer connected in the deal. I am making this statement in order that the inside facts in connection with the matter may become known."

Drops Names of E-M-F and Flanders

DETROIT, MICH., Aug. 3.—On the first of August, the familiar names E-M-F 30 and Flanders 20 went out of existence and henceforth these two cars made by the Studebaker Corporation will be known as Studebaker 30 and Studebaker 20, respectively. This change of name has been made because the factories for these machines are now entirely controlled by the Studebakers, and the officers of the corporation as well as the dealers selling the cars felt that the change was not only advisable but virtually essential. It has been done largely through a desire for consistency and uniformity, as well as from the fact that the Studebaker name is well known and of trade value. The old

monograms which the cars bore have long since lost their significance, and the concern sees no reason why the machines should not bear the name of their present makers. Not only will all cars hereafter made carry the Studebaker script name-plate, but as soon as possible all dealers will be supplied with them, so that the cars in present use may be equipped with them.

Little Demand for Crude Rubber

Crude rubber experienced another dull, draggy week with prices about stationary and both buyers and sellers inactive. Importations aggregated a rather large total, the week-end receipts being 2,800 packages. The buying was placid and was reported to be for jobbing accounts. Reports have been circulated that the Brazilian syndicate has disposed of 650 tons of hard, fine Para, about one-third of its holdings, selling in the London market. In the meantime, since July 1, the movement down the Amazon to Para is estimated at 1,600 tons. The big movement to market is probably accountable for the lack of eagerness on the part of buyers and the tremendous manufacturing consumption is said to be the main support under the market. While the bids and offers have been quietly made in practically all the markets, trade has been satisfactory. The market has stood for a week around \$1.16 1-2 on a basis of up-river fine.

Overland Close Up Garford Deal

TOLEDO, O., Aug. 4.—The formal taking over of the Garford Company's plant at Elyria, O., by the Willys-Overland Company occurred here on August 1, when, at a meeting of the Overland directors, John N. Willys was elected president of the Elyria company, which will be known in the future as the Garford Department of the Willys-Overland Company. At this meeting,

Market Changes for the Week

Changes in the metal market were few and far between, and whatever fluctuations took place during the week were mostly of the downward sort. Thus lead declined 17 1-2 cents per 100 pounds, tin 25 cents for the same quantity, while copper remained unchanged during the entire week. One of the interesting features of the dull copper market is that the quotation of electrolytic metal is now above that of Lake Superior copper and has remained so owing to an intense inactivity of the market. Tin was erratic and mostly weak during the last 7 days. Steel in beam and channel form found no demand, although it was offered at \$1.51 per 100 pounds. The table shows the price fluctuations for the week:

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Change
Antimony, per lb.	.07 1/4	.07 1/4	.07 1/4	.07 1/4	.07 1/4	.07 1/4	.....
Beams & Channels, 100 lbs.	.....	.....	.....	.....	.....	a.151 1/2	.....
Bessemer Steel, Pittsburgh, ton	21.50	21.50	21.50	21.50	21.50	21.50	.....
Copper Elec., lb.	.17 3/4	.17 3/4	.17 3/4	.17 3/4	.17 3/4	.17 3/4	.....
Copper, Lake, lb.	.17 1/4	.17 1/4	.17 1/4	.17 1/4	.17 1/4	.17 1/4	.....
Cottonseed Oil, August, bbl.	6.57	6.41	6.54	6.55	6.45	6.45	— .12
Cyanide Potash, lb.	.19	.19	.19	.19	.19	.19	.....
Fish Oil, (Menhaden)	.33	.33	.33	.33	.33	.33	.....
Gasoline, Auto, 200 gals. @	.21	.21	.21	.21	.21	.21	.....
Lard Oil, prime	.85	.85	.85	.85	.85	.85	.....
Lead, 100 lbs.	4.67 1/2	4.72 1/2	4.72 1/2	4.72 1/2	4.72 1/2	4.50	— .17 1/2
Linseed Oil	.73	.70	.70	.70	.70	.70	— .03
Open-Hearth Steel, ton	22.00	22.00	22.00	22.00	22.00	22.00	.....
Petroleum, bbl., Kansas crude	.70	.70	.70	.70	.70	.70	.....
Petroleum, bbl., Pa., crude	1.60	1.60	1.60	1.60	1.60	1.60	.....
Rapeseed Oil, refined	.68	.68	.68	.68	.68	.68	.....
Rubber, Fine Up-river Para	1.16	1.16	1.16	1.16	1.16	1.16	.....
Silk, raw Ital.	4.15	.....	.....	.....	.....	4.30	+ .15
Silk, raw Japan	3.67 1/2	.....	.....	.....	.....	3.70	+ .02 1/2
Sulphuric Acid, 60 Beaumé	.99	.99	.99	.99	.99	.99	.....
Tin, 100 lbs.	45.50	45.00	44.50	44.50	44.50	45.25	— .25
Tire Scrap	.09	.09	.09	.09	.09	.09	.....

A. L. Garford resigned as president of the company bearing his name, the interests which he owned in it being taken by the Willys-Overland organization. Mr. Willys' full title will be president and general manager of the Garford Department, in which capacity he has been acting for some time. The new department will be largely managed from Toledo. Mr. Willys will retain his office in that city.

Frank Briscoe Out of U. S. Motors

According to announcement made by the United States Motor Company, Frank Briscoe, one of the vice-presidents of the company, who has had charge of the designing department, has resigned. He will sail for Europe late in August to make a study of European automobile engineering. He will probably remain abroad for a year or more.

While resigning his office in the United States Motor Company, Mr. Briscoe will continue as president of the Briscoe Manufacturing Company, one of the subsidiaries of that company.

Republic Rubber Increases Capital

YOUNGSTOWN, O., Aug. 6—At the special meeting called for Monday last, the stockholders of the Republic Rubber Company voted an increase of the authorized capital from \$4,000,000 to \$10,000,000. A number of extensions and improvements were discussed and the semi-annual statement was read, showing a large increase in the business of the company.

At the directors' meeting following, the board declared a special stock dividend of 35 per cent. to the common stockholders of record August 1. It is stated also that an offering of preferred stock will be forthcoming in a few months. The regular cash dividend at the rate of 2 per cent. per quarter was declared.

Automobile Securities Quotations

Studebaker and General Motors were the strongest features of the week in the line of automobile securities, both companies being listed on the New York Stock Exchange and subject to the immediate effects of public demand in either direction. Reports of excellent business in the industry generally and particularly the optimistic attitude of the officers of both these companies is the cause of the strength shown. General Motors preferred moved up under active trading to 80 and both Studebaker issues advanced sharply, the common rising above 41 while the preferred rose to 97 1-2. Other issues were steady.

	1911		1912	
	Bid	Asked	Bid	Asked
Ajax-Grieb Rubber Co., common.....	..	..	125	..
Ajax-Grieb Rubber Co., pfd.....	..	..	95	100
Aluminum Castings, preferred.....	..	..	100	..
American Locomotive, common.....	38	38 1/4	43 1/4	43 3/4
American Locomotive, preferred.....	106	107	..	..
Chalmers Motor Company.....	..	..	145	155
Consolidated R. T. Co., common.....	5	10	12 1/2	14
Consolidated R. T. Co., preferred.....	10	20	50	59
Diamond Rubber Company.....	..	..	..	..
Firestone Tire & Rubber Co., com.....	160	170	277	282
Firestone Tire & Rubber Co., pfd.....	105	107	105 1/2	107 1/2
Garford Company, preferred.....	..	..	99	101
General Motors Company, common.....	51 1/2	52	35 1/2	36 1/2
General Motors Company, preferred.....	86	87	79 1/4	80
B. F. Goodrich Co., common.....	..	..	74	74 1/2
B. F. Goodrich Co., preferred.....	..	..	107	107 1/2
Goodyear Tire & Rubber Co., com.....	230	240	333	338
Goodyear Tire & Rubber Co., pfd.....	105	107	104	105
Hayes Manufacturing Company.....	..	..	93	97
International Motor Co., com.....	..	..	28	29 1/2
International Motor Co., pfd.....	..	..	84 1/4	95 1/4
Lozier Motor Company.....	..	..	50	60
Miller Rubber Company.....	..	..	145	150
Packard Motor Company, preferred.....	..	..	105	106 1/2
Peerless Motor Company.....	..	..	..	150
Pope Manufacturing Co., common.....	48	52	32 1/4	34
Pope Manufacturing Co., preferred.....	78	80	73 1/2	75
Reo Motor Truck Company.....	8 1/2	10	9 3/4	10 1/4
Reo Motor Car Company.....	23	25	21	24
Studebaker Company, common.....	..	..	41	41 1/2
Studebaker Company, preferred.....	..	..	97	97 3/4
Swinehart Tire Company.....	..	..	96	99
Rubber Goods Company, common.....	..	..	100	..
Rubber Goods Company, preferred.....	..	..	105	..
U. S. Motor Company, common.....	39	40	3	3 1/4
U. S. Motor Company, preferred.....	79	80	13 1/4	14
White Company, preferred.....	..	..	107 1/2	108 1/2

N. A. A. M.'s Meeting

Convenes at the Summer Home of General Manager Miles—Freight Rate Advance Discussed

Question of Car Insurance Also Considered—New Members Elected—St. Louis Dropped from Show Circuit

ONE of the most pleasant gatherings of the National Association of Automobile Manufacturers was held last week at Christmas Cove, Me., when the regular July and August sessions of the association were combined and conducted at the summer home of Samuel E. Miles, general manager of the association.

The business session, which was held on Monday, occupied about 4 hours and was largely devoted to the consideration of routine matters. One of the interesting matters that were discussed was the recently announced advance in freight rates on automobiles consigned to the Pacific coast. The former rates are \$3 per 100 pounds in carload lots from Ohio, Michigan and Atlantic Seaboard common points to Pacific coast common points. The new rates differentiate between New York and New England common points, Buffalo common points and Detroit common points, and raise the rates respectively to \$3.30, \$3.20 and \$3.10 per 100 pounds.

As the general practice is to ship two large cars or three medium-sized cars in a car, the raise would mean an advance in cost of shipment on automobiles from New York and New England of about \$15 per vehicle; \$10 per vehicle from Buffalo and common points and \$5 per vehicle from Detroit and its common points. Just what will be done about the matter is still problematical, but the case has been referred to James S. Marvin, traffic manager of the association.

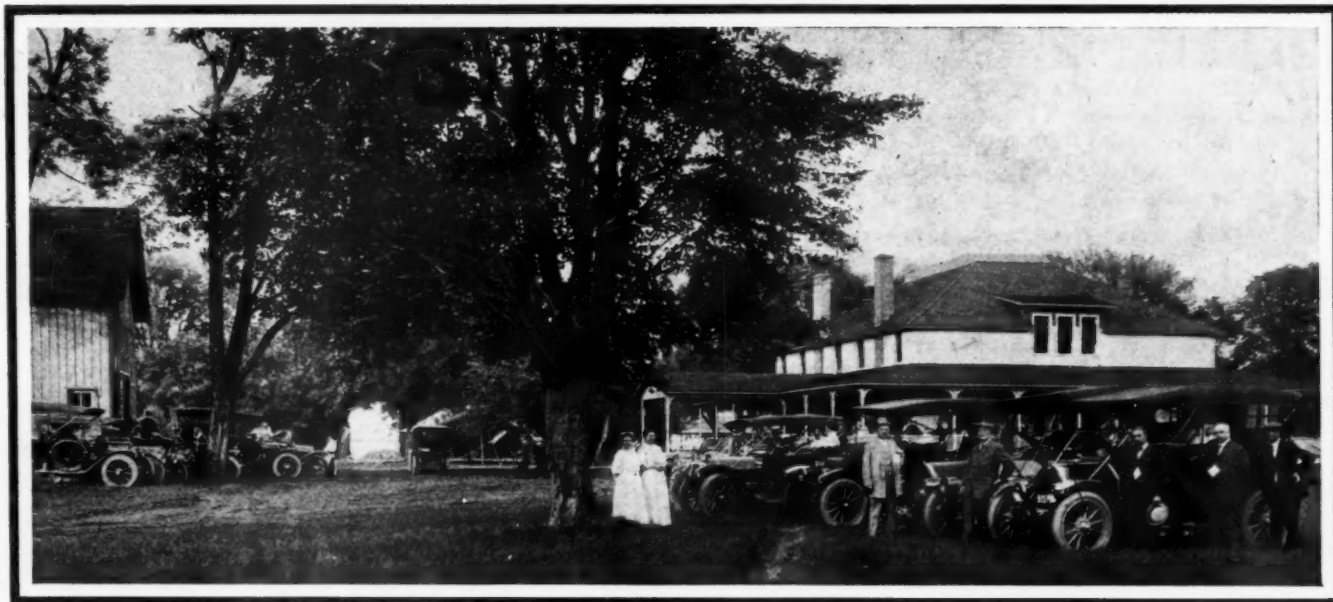
Insurance Rates Are Too High

Another subject discussed was the problem of insurance. Arguments were made that the rates charged for the various kinds of insurance were so high that many automobile owners were not taking out policies. This resulted in limiting the business of the insurance companies and the tendency was to cause owners of automobiles who were most liable to accident and mishap and who could not afford to do without insurance, to furnish a considerable part of the total business. Under these circumstances it was quite likely that the ratio of losses paid would be larger than they would be if the business was on a more reasonable basis and consequently broad and general.

No action was taken officially by the association, but the matter was referred to a committee for investigation and report.

Most of those who attended the meeting arrived at Portland on Saturday morning and were taken to Christmas Cove in automobiles. Sunday was spent in recreation as was most of Monday and all day Tuesday. Many of the visitors stayed over Wednesday and a few were still left to enjoy the hospitality of Mr. and Mrs. Miles at the end of the week.

A general meeting of the N.A.A.M. will be called for the near future, probably for the dates of the meeting at which the show allotments are made in October. The Motor Car Manufacturing Company of Indianapolis and the Warren Motor Car Company of Detroit have been elected to membership. The following changes have been made in representation: H. F. Campbell, Ideal Motor Car Company, to succeed E. C. Sourbier; Gleason Murphy, Rapid Motor Vehicle Company, to succeed J. F. Corl; H. S. Stebbins, Reliance Motor Truck Company, to succeed A. M. Bently. W. C. Teasdale represents the Ideal and Lucius E. Wilson the Warren companies. St. Louis has been dropped from the local show circuit, the dealers wishing to show in the Fall instead of on the dates suggested.



Scene at the Cold Brook Club, where the Elmira Automobile Club held its annual field day

Buffalo Club Opens New Home

Structure Cost \$75,000; Said to Be Finest of the Kind in the Country

BUFFALO, N. Y., Aug. 6—The Automobile Club of Buffalo's country clubhouse at Clarence, N. Y., which was constructed at a cost totaling \$75,000, is said to be the finest country home owned by any motor organization in the United States. The estate on which this clubhouse is located comprises 70 acres, on which are stately pine and hickory trees as well as apple trees and shrubbery. The clubhouse is approached from the main highway by a broad smooth road leading directly to arched driveway. The building itself, which is 200 feet long by 136 feet at greatest width, is of Mission architecture and represents a spacious bungalow. The general reception room on the first floor has seating capacity for 500 people. This room is finished in weathered oak, unpolished, with vaulted ceilings and five fireplaces of red brick to hold large logs. Close to the main entrance in the interior of the clubhouse is a spiral staircase

Elmirans' Annual Field Day

Over 200 Members and Friends Enjoy the Outing at Cold Brook Club Grounds

ELMIRA, N. Y., Aug. 5—About two hundred persons, including members, families and friends of the Elmira Automobile Club enjoyed the first annual field day of that organization last Wednesday at the Cold Brook club grounds, fifty automobiles being used in carrying the party to and from the grounds. During the afternoon cards and other games were enjoyed by the motorists and their guests. The menu was prepared under direction of two experienced caterers, Thomas Barnes and Frank Berner, and consisted of most delectable foodstuffs. At 9 o'clock the automobiles, which had been parked on the club grounds, were formed into a procession and the return was made to Elmira.

which leads to apartments on second floor planned especially for women guests visiting the clubhouse.



Magnificent country club house of the Buffalo Automobile Club at Clarence, N. Y.

Ready for the Galveston Races Dawson Refused Reinstatement

Three-Day Carnival Will Bring Together Racing Cracks of North and South

GALVESTON, TEX., Aug. 3—Practice for the automobile races to be held on the hard-packed Galveston Beach, August 8, 9, 10, under the auspices of Galveston Automobile Club and the Texas State Automobile Association, has begun and daily hundreds of motor enthusiasts line the course to watch the tuning-up sprints.

A grandstand seating 10,000 people is now finished. From elevated seats in this stand the entire length of the 2 1/2-mile course will be in full view of the spectators at all times. This arrangement is new for beach races, which seldom proved spectacular because of courses being too long, permitting the cars to be seen only at the passing point. At low tide, the beach provides 200 feet of driveway, with an additional 100 feet or more which is taken up with the grandstand and parking spaces.

There are five events on the program for each of the first two days of the meet and a 200-mile free-for-all contest will be run on the third day.

Contest Board Also Disqualifies Schacht Company for Violating Advertising Rule

FOR violating rule 75, which prohibits advertising as performances of stock cars the showings of automobiles in races under non-stock conditions, the Schacht Motor Car Company, of Cincinnati, has been disqualified and suspended until the first of the year.

The offense upon which the ruling is based was the performance of the Schacht entry at the Memorial Day race at Indianapolis.

In addition to the Schacht matter the Contest Board of the American Automobile Association considered a number of other cases. Applications for reinstatement by Joseph C. Dawson and C. E. Stuart, suspended for participating in an unsanctioned meet, were held up pending a more satisfactory explanation. Joseph M. Matson was restored to good standing, having been suspended for failure to report at a sanctioned meeting in which he was entered. Hugh B. Andrews, promoter of the recent race meeting at West Side Park, Wilkes-Barre, Pa., was suspended.



Trying out a score of local cars preparatory to this week's races on Galveston Beach

Four Class C events and a special Class E event are slated for the first day, these ranging in distance from 10 to 75 miles. In the latter event, in order that a car win a prize, two or more cars must start in the same class and must finish within a period of 90 minutes. On the second day a similar event is to be run and in this the winning machine must finish within 60 minutes. Also, on the second day, three special Class E events are to be run off and several attempts will be made at the beach record.

Preparing Milwaukee's Race Course

MILWAUKEE, WIS., Aug. 6—A swarm of workmen are on the 8.2 miles of road comprising the new Vanderbilt cup course, and fourteen new culverts of the most advanced type have already been completed and the approaches graded. Two bridges are now under construction, and should be completed by August 10. The roads are all of macadam and have been down for more than 15 years. The surface is being scarified and a layer of 4 inches of No. 2 rock is being added. Two inches of fine screenings will complete the surface, which after being treated with a 70 per cent. asphaltum preparation as a binder, will be rolled to granite-like surface and later oiled and sanded several times. The 2.5 miles of concrete road which will comprise part of the course will be ready at the same time as the rest of the work.

until the first of the year for failure to comply with the requirements of the board with regard to safety precautions.

The following official records were accepted:

Santa Monica Road Race, Los Angeles, Cal.			
Race	Miles	Car and driver	Time
Free-for-all Non-Stock	303.012	Fiat (Tetzlaff)	3:50:57.
231-300 CL. "C"	151.506	Mercer (DePalma)	2:10:43.85
161-230 CL. "C"	101.104	Maxwell (Josrimann)	1:37:57.90

Tetzlaff's average, 78.72 miles per hour.

Speedway Records Regardless of Class					
Miles	Time	Driver	Car	Place	Date
3 Miles	1:54.88	Bragg	Fiat	Los Angeles,	May 5, 1912
4 Miles	2:33.37	Bragg	Fiat	Los Angeles,	May 5, 1912
5 Miles	3:11.75	Bragg	Fiat	Los Angeles,	May 5, 1912

Class C Speedway Records, 161 to 230 Cubic Inches					
25 Miles	21:12.42	Tower	Flanders Special	Los Angeles,	May 5, 1912

Class C Speedway Records, 231 to 300 Cubic Inches					
1 Mile	00:45.60	De Palma	Mercer	Los Angeles,	May 5, 1912
2	1:31.55				
3	2:17.17				
4	3:02.70				
5	3:47.34				
10	7:27.33	J. Nikrent	Case	Los Angeles,	May 5, 1912
15	11:11.17				
20	14:56.05				
25	18:53.20				

ST. LOUIS, MO., Aug. 4—The annual run of the Automobile Manufacturers' and Dealers' Association of St. Louis is to be a sociability event instead of a reliability. Owners will be invited to join the tour, which will be run off August 22, 23, and 24.

Right or Left Control?

Engineers and Lay Readers Take Up Discussion of "The Automobile's" Article on Subject

Advocates of Left-Side Steer Offer Excellent Arguments in Favor of Their Position

DES MOINES, IA.—My opinion is that the left-side drive is the proper one, after having used a car for one season with a left drive and previously using one with a right-side drive. I believe the advantages of the left-side are very clear, especially for city use. In passing a team going in your direction on the country road you are more apt to watch the road closely with a left-side drive than with the right and in this case you can always better be your own judge as to how far to turn out, and in meeting a team coming in the opposite direction, or in meeting another car, you can stay to the center of the road and allow for less room between the cars or between the team and car if the road is narrow.

If you are following a street car in the city it is certainly an advantage to drive behind a car where there is a double track and be able to get out far enough to see if there is a car coming and avoid same if it is coming, which is impossible if you have a right-side drive. Also if you are driving where you have to turn square corners it is easier to see the man coming behind who would likely be driving faster than you and passing you to your left.

I note that a great many people having right-side drives have a tendency to stay very close to the center of the road when you are meeting them. Sometimes this makes it dangerous to pass on a narrow highway.

Personally I have no choice so far as lever control is concerned, either right or left-side is satisfactory, and after selling both right and left-side drives for 2 seasons I find that there are a great many people not favorable to the left-side drive until after they have had a little experience, after which they always seem to favor it. For city use I would certainly recommend the left-side drive, and for country use I think one will answer the purpose as well as the other.—F. S. DUESENBERG, Sears Automobile Company.

Horsemen Favor Left-Side Seat

DETROIT, MICH.—The subject of left-side steering is one on which I have had fixed ideas ever since I built my first cars in 1900 and 1901. As every car is used a great deal in towns or cities I do not believe the possible advantages of a right-side drive for open country touring need to be taken into consideration. I have driven both kinds a great deal and I believe the preponderance of advantages is in favor of the left-side type.

In crowded traffic I believe a left-side steered car will make at least 25 per cent. better time than the right side. The ability to see if the road is clear to the left for passing enables one to keep going on take advantage of every opportunity to pass.

In turning to the right one can look to the gear as easily from the left side as from the right, and in turning to the left to cross the counter running traffic the left-side seat is obviously the better position. The same holds true also when turning around to go in the opposite direction. When riding on the front seat with the driver of a right-side steering car one is often asked by the driver whether or not the road is clear to the left of the overtaken vehicle.

Several years ago there were a number of articles in *Rider and Driver* on this subject and they disclosed the fact that many expert horsemen favored and were driving in the left-side seat. If right-side steering is accepted in left-turning countries such

as England and others, and as has recently been adopted in France, it seems only logical that left-side steering is correct for right-turning countries like America. I have yet to see a communication in any of the English papers objecting to right-side steering. This considering the Englishman's habit of writing letters to his favorite paper upon the slightest provocation, would seem to be the best indorsement of left-side steering in this country.

As to country road driving I believe that it is more a matter of what one is accustomed to rather than a question of the relative advantage. England has notoriously narrow and hedge-obstructed roads but we hear no demand for left-side steered cars for country use. Personally I prefer the left-side steering car for all uses after driving both over long periods of time and under all conditions. I believe the left-side control has retarded the adoption of left steering but with the advent of the center control I expect to see left-side steering come rapidly into favor for both pleasure and commercial cars.—EDWARD T. BIRDSALL, M. E., Consulting Engineer.

Engineer Shows Left-Side Merits

DETROIT, MICH.—I think the problem of whether the right or left-side drive is preferable can be divided into two classes: matters regarding the mechanical construction and, second, advantages to driver and passengers.

Now as regards the mechanical construction of the car, the left-side drive results in having the change-speed levers mounted directly on the gearbox, forming one unit, with consequent elimination of the usual right-side drive troubles where two telescoping shafts run from the gearbox to frame, on the end of which the control levers are mounted. This construction requires very careful fitting to avoid too much rattle on the one hand, or cramping on the change-speed lever on the other, due to the fact that each connects two different members of the chassis—namely—the frame and the gearbox, and these two units are not immovably connected to each other. This point, of course, assumes the placing of the change-speed levers in the center of the car. This construction, generally known as central control logically follows left-side steer, owing to the fact that with the fore-door bodies levers on the left side are very awkward to install properly in a reasonable width of body.

Most makers have found it necessary in the past to use heavier springs on the right side of cars with right-side steer, due to the fact that the torque reaction of the motor causes a considerable load on the right side of the car, and with well crowned roads there is also a tendency for a greater weight to be thrown on the right side. The tires carried on the right side also tend to increase the weight, and with right-side drive the driver also sits on that side. With left-side drive the driver's weight is thrown on the left side, and when there is no other passenger in the car (and considerable driving is done alone) his weight balances to a certain extent some of the other constant weights on right side of the car.

Then such a small item as the position of the iron for supporting top front bow is bettered with left-side drive and central control, owing to the fact that this arm can be placed further forward without interfering with driver's elbow when changing gears and putting on brakes. Anyone who has had his funny bone shocked severely due to contact with the top iron in putting on brakes and changing gears suddenly will not fail to appreciate this point.

The advantages of the driver are many. Also to the passenger in the front seat. The obvious ones, of course, which have been most noticed, are the easy exits of passenger and driver to the sidewalk or curb without having to walk around the front of car through the mud. Also the passenger can step directly from the running board to the curb without the considerable jump from the running board to the street, which is a very important item in the case of elderly people and invalids, and with such people the front seat is a great favorite, on account of its being more easy riding and easier to enter, due to the being right alongside door.

Another advantage of left-side drive is the ability of the driver to see around street cars and slow-moving vehicles it is desired to pass. With left-side drive the driver can see an approaching street car or vehicle beyond the car he wishes to pass, before turning way out. With right-side drive it would be necessary to clear the car ahead before the driver could see whether another car or vehicle was approaching. This is especially important in winter time when in many parts of the city, after a heavy snow storm, the traffic is confined principally to the two central car tracks. Also the mirror used for observing traffic in the rear is of much more value with driver on the left side than where he has to see the mirror from a considerable distance or from the right-hand side of the car.—J. G. PERRIN, Lozier Motor Company.

Right Drive and Left Control

EAST CANAAN, CONN.—Your recent articles on the merits of right and left-side control were worthy of the attention of all motorists, but there is one point in this controversy that I failed to see mentioned. Personally I favor right-side steer with central levers for this reason: When shifting gears it is possible to steer and at the same time throttle the motor with the right hand, leaving the left free to work the shifting lever. Now with the levers at the right of the driver, in order to shift gears, it is necessary for him to remove his right hand from the throttle lever and also the wheel, which is rather awkward for anyone who throttles by hand.

Of course this does not apply to those who use the foot accelerator, but in my humble opinion, the foot accelerator is all wrong, the foot not being as sensitive or as well adapted to this purpose as the hand. It is very hard also to properly control a car on a rough road with the foot.

It is very gratifying to me to see the rapid gains that are being made by the little-six type of car. The superiority of the six-cylinder motor seems to be generally admitted, but the makers of this style of engine have usually built heavy, high-powered cars and charged as high a price for them as they thought the luxury-loving class could be induced to pay.

I believe that there is a fast increasing number of the motor wise who are waiting for a reliable, low-powered moderate priced \$1,500 to \$2,500 light six, and I predict a brilliant future for this type of car.—D. C. CANFIELD.

Left Drive Favors Passengers

NEW YORK CITY—The point of left or right-side control is very vital to say the least. I cannot see any advantages of the right-side control. Center placing of gear shift is coming fast and the public demands a right-hand operation. This forces the steering column to the left. In road driving I have always feared the oncoming car above everything else for this reason. Two cars meeting at high speed pass each other at the sum of the two speeds. With a ditch on one side and the oncoming car on the other I would much prefer to just miss the oncoming car and take the chances on the ditch.

In overtaking another car traveling in the same direction you do not attain the high speed of passing and usually take more precaution to see that you have a clear road to get around or probably because you don't know which way the fellow in front will turn.

The fore-door has come to stay and for the sake of alighting on the sidewalks or stepping stone it is certainly preferable to have the steering column on the left side. The passengers in my opinion should have the preference over the chauffeur.—ANONYMOUS.

NEW ORLEANS, Aug. 6—Passengers arriving on last week's boat from Bermuda state that the question of lifting the ban against automobiles is being considered. Motor cars have been prohibited on the island for several years due to recklessness that characterized their operation when first introduced into Bermuda.

Foreign Trade Openings

Opportunities Abroad as Indicated by the Government Daily Reports from Consular Stations

2-, 3-, 5- and 10-Ton Trucks in Demand—Agencies for Pleasure Cars Wanted in European City

AUTOMOBILE TRUCKS—A leading dealer in automobiles and accessories in a European city informs an American consulate that he desires to receive from American manufacturers of automobile trucks immediate offers f.o.b. New York of automobile trucks of 2 to 3 tons capacity. Prices in excess of \$2,500 cannot be considered, nor offers which do not carry with them exclusive agency rights for the country. Correspondence should be in English, and catalogues and drawings should be accompanied by all necessary technical information. File No. 9270.

MOTOR TRUCKS FOR HAULING ORE—A report from an American consul in Mexico states that a company in his district is in the market for a couple of motor trucks for hauling ore from mines to the railways. These trucks would probably require steel instead of rubber tires, as the roads on which they are to operate are rough, rocky, mountain stretches. They would have to be sufficiently powerful to travel short distances of 20 per cent. grade road. In the absence of rubber tires the trucks would have to be equipped with pneumatic shock-absorbing springs in order to preserve the motor. Information and prices are requested on 3, 5 and 10-ton ore capacity trucks. File No. 9262.

Want Passenger and Freight Cars

AUTOMOBILE AGENCY—An American consul in a European country reports two reliable business men in his district, one of whom resided for 12 years in the United States, desires to procure the agency of a strongly built, medium-weight, good appearing automobile which can be retailed there at from \$900 to \$1,860. The inquirers are well acquainted with the business element of the city in which they are located, speak and write English, are energetic, and in the opinion of the consul would make first-class representatives for any automobile firms desiring representation. File No. 9261.

PASSENGER AND FREIGHT AUTOMOBILES—One of the commercial agents of the Department of Commerce and Labor reports that a bank in an American city, with European connections, is requested by a prominent foreign automobile transport company to procure catalogues and price lists of American passenger and freight automobiles. All communications should be transmitted to the American offices to be forwarded. File No. 9301.

DIESEL ENGINES—An American consular officer reports that a firm in his district desires to secure the agency for American manufacturers of Diesel engines. It is believed these goods can be introduced to the satisfaction of the manufacturers. The members of this firm, one of whom is an American, are energetic and have an excellent reputation in the city in question, as they have been identified with leading local concerns. Correspondence may be in English. File No. 9295.

TRADE WITH BARCELONA—At the request of the consulate general, the Barcelona custom house compiled statistics showing the imports into Barcelona from the United States. These indicate increasing possibilities for the introduction of American goods. For instance, seven more automobiles were imported from the United States in 1911 than in 1910, but there is undoubtedly opportunity for a far greater trade here if the proper methods are adopted by the American manufacturers.

TRADE WITH VANCOUVER—The automobiles invoiced at the Vancouver consulate general for shipment to the United States during 1911 were valued at \$36,397, an increase of \$7,919 as compared with 1910.

Exports Gain 65 Per Cent.

Foreign Countries Get Over \$10,000,000
More of Our Automobile Products
Than Last Year

Imports Increase Only 8 Per Cent. for the Fiscal Year—
Tire Exports Show 27 Per Cent. Gain

WASHINGTON, D. C., Aug. 5—Official figures of automobile exports and imports for the fiscal year ending June 30, 1912, have been issued by the Department of Commerce and Labor. The showing, as far as export business is concerned, is not up to the estimates sent out from semi-official sources last month, but it is sufficiently impressive in that it proves that the export business was about 65 per cent. larger than it was during the foregoing period based upon the official figures. Last year, it will be remembered, the manufacturers who had been particularly active in the export field, protested that the government figures were much too low and the same kind of a protest is being heard now, although so far it has not been so pointed as it was last year.

The total amount of export business in the automobile line, including cars, parts and tires was \$25,657,294, against \$15,509,229, during the preceding fiscal year.

The tabulation and comparison are shown in Table I.

It will be noted that Canada maintains first place as a customer of the United States and that Great Britain and British Oceania follow in order, the three British divisions taking an amount in excess of the total exportation of the previous year.

There was a slight reduction noted in France, Germany, Italy, Mexico, and the West Indies and a measurable increase in South America and in scattering business.

With the value of tires reckoned in with the totals to aggregate sum of the exports would probably reach the unofficial figure of \$28,000,000.

The automobile imports for the year show a total of \$2,438,325, which is an increase of \$288,000 over the business of the previous year and a decrease of \$1,400,000 as compared with the fiscal year of 1910.

The figures and comparisons are shown in Table II.

Tire Exports Gain 27 Per Cent.

WASHINGTON, D. C., Aug. 3—Exports of motor car tires during the fiscal year ended June 30, 1912, amounted in value to \$2,657,809, as against \$2,085,107 worth exported during the previous fiscal year. The exports for the month of June increased in value from \$246,625, in 1911, to \$321,889 in 1912.

The total imports of India rubber during the fiscal year just ended amount to 110,210,173 pounds, valued at \$93,013,255, as against 72,046,260 pounds, valued at \$76,244,603, imported during the fiscal year 1911.

The imports for June last amounted to 6,815,153 pounds, valued at \$5,442,859, while in June a year ago the imports amounted to 6,322,768 pounds, valued at \$5,508,081.

TABLE I—EXPORTS OF AUTOMOBILES AND PARTS FOR JUNE, 1911 AND 1912, AND FOR 12 MONTHS ENDING JUNE, 1910, 1911 AND 1912

ARTICLES AND COUNTRIES	JUNE—				TWELVE MONTHS ENDING JUNE—					
	1911		1912		1910		1911		1912	
	Quantities	Values	Quantities	Values	Quantities	Values	Quantities	Values	Quantities	Values
AUTOMOBILES, AND PARTS OF—										
Automobiles.....No.	1,554	\$1,702,872	1,941	\$2,116,174	6,926	\$9,548,700	11,803	\$12,965,049	21,757	\$21,550,139
Exported to—										
United Kingdom.....		\$529,382	327	\$222,961		\$2,656,214		\$2,595,679	5,716	\$4,454,448
France.....		37,948	67	49,905		825,904		532,121	574	469,721
Germany.....		19,886	27	35,787		275,241		251,629	288	226,227
Italy.....		18,517	42	35,185		337,614		215,041	211	193,037
Other Europe.....		117,555	161	161,123		550,414		764,287	1,223	1,031,434
Canada.....		861,975	755	1,026,567		4,383,487		6,774,769	6,288	7,560,655
Mexico.....		40,861	7	8,470		540,325		649,666	273	418,599
West Indies and Bermuda.....		27,724	30	31,822		413,888		398,593	329	350,440
South America.....		99,040	167	174,145		342,767		891,133	1,611	1,911,066
British Oceania.....		206,130	146	143,376		350,193		1,352,532	3,625	3,280,988
Asia and other Oceania.....		52,801	136	158,478		348,523		786,570	1,137	1,197,155
Other countries.....		15,939	76	68,355		165,650		297,209	482	456,369
Parts of (except tires).....		\$324,886		\$361,835		\$1,641,520		\$2,544,180		\$4,107,155
Total.....		\$2,027,758		\$2,478,009		\$11,190,220		\$15,509,229		\$25,657,294

TABLE II—IMPORTS OF AUTOMOBILES AND PARTS FOR JUNE, 1911 AND 1912, AND FOR 12 MONTHS ENDING JUNE, 1910, 1911 AND 1912

ARTICLES AND COUNTRIES	JUNE—				TWELVE MONTHS ENDING JUNE—					
	1911		1912		1910		1911		1912	
	Quantities	Values	Quantities	Values	Quantities	Values	Quantities	Values	Quantities	Values
AUTOMOBILES, AND PARTS OF—										
Automobiles.....No. dut....	117	\$256,514	42	\$100,927	1,473	\$2,851,446	888	\$1,898,843	963	\$2,134,181
Imported from—										
United Kingdom.....	12	\$34,820	7	\$17,105	101	\$236,015	128	\$297,382	188	\$434,611
France.....	29	69,424	21	50,106	782	1,467,646	377	797,931	401	964,635
Germany.....	41	81,513	3	8,806	150	368,219	137	297,153	116	259,313
Italy.....	14	21,385	5	10,425	352	587,052	130	239,079	131	199,555
Other countries.....	21	52,372	6	14,485	88	192,514	116	267,298	127	276,067
Parts of (except tires).....dut..		\$15,748		\$20,408		985,638		\$351,916		\$304,144
Total automobiles, and parts of.....		\$272,262		\$121,335		\$3,837,084		\$2,250,759		\$2,438,325

Digest of the Leading Foreign Journals

Water and Oxygen the Enemies of Aluminum—Centrifugal Oiling of Four Crankpins—Radius Rods as Base for Chain Casings—Some Errors in Laboratory Tests—A Revision of Horsepower Formulas with Stroke Considered

CORROSION of Aluminum—Through an extended series of experiments at the Royal Prussian Station for the Testing of Materials some of the conditions have been determined which lead to a decomposition of aluminum. It had been observed that kitchen utensils made of this material in very numerous instances deteriorated rapidly even before they were taken into use, as when stored in the warehouses of manufacturers, but especially when they were used for cooking purposes. Such utensils are usually stamped cold from rolled plates or sheets. The efflorescences, scale formations and marks of decomposition are in some instances irregular or evenly distributed over the entire surface, but in many other instances run in streaks following the direction in which the metal has passed through the rollers. In some cases raised blisters covered efflorescences of the metal underneath. A chemical examination tended to show that the silicon content of the metal has nothing to do with the decomposition. Long exposure to the atmosphere, on the roof of the test station, and to changes of temperature, but with the exclusion of direct contact with water or snow, showed conclusively that the metal did not undergo any changes in appearance or weight under those conditions. On the other hand, constant exposure to the municipal water on tap at the institution showed very strong effects, and these were mainly local blisters and scales. The local attack was most pronounced with the hardest metal; that is, the metal which had been rolled under highest pressure and had received the smoothest finish. But the loss of weight was in those cases least pronounced. Tests with distilled water gave a larger total loss of weight, but the attack was never local, consisting mainly in transforming a film of the entire surface into hydroxide of aluminum.

The various forms of decomposition caused by the exposure to the municipal water were very similar to those observed on the used cooking utensils which had been sent in from various sources for test purposes. Tests consisting in exposure to air alternating with exposure to municipal water showed attacks which were mainly local like those resulting from constant exposure to the water alone, but they were less pronounced.

Further tests at which aluminum plates were submerged for 62 days in distilled water to which the oxygen of the air had

no access, watergas being blown over the vessel for the entire duration of the test, showed no effects; and the municipal water under the same condition also failed to attack the metal. This demonstrated that the combined presence of water and oxygen is required to effect any decomposition, as in the case of iron, and also that the aluminum at house temperatures has no power to decompose the water. A special series of comparative trials proved that higher temperatures of the water and the presence of free carbonic acid gas, especially the latter, aggravated the decomposition of aluminum very much.—From *Werkstattstechnik*, July 15.

Delahaye Oiling System—The general plan of Delahaye cars is a model of conservatism, showing a typical shaft-driven car with a four-cylinder motor and the change-gear in the middle of the chassis. The 1912 date crops out in some of the details. The cylinders have a bore of 85 millimeters (3.25 inches) and a stroke of 130 millimeters (5.15 inches). The maximum torque is developed at 1400 revolutions. The monobloc motor casting encloses all cylinders and all the manifold piping for cooling water, gas intake and exhaust, which arrangement gives a clean-cut appearance and silence. The crankshaft is supported only in two bearings P, Fig. 1, but is short and thick and hollow. Its central bore E admits of increased diameter and rigidity with minimum weight and also serves as an air vent from the crankcase, relieving possible accumulations of air pressure therein, and has the advantage over the customary air risers that the air thrown out through this bore comes from the axial line of the mechanism where there is no oil mixed with the air, since oil is thrown to the circumference by centrifugation. The result is that the outside of the motor and the crankcase remain free from oily deposit. A little weight saving in the movable parts is effected by having the connecting-rod knuckle of the width of the crankpin only on the pressure side, where the force of explosions is taken up, while the semi-circular yoke T, which only takes care of compression and momentum, is considerably narrower, as shown in Fig. 1. The two end bearings of the motor shaft are supported by long bolts AAAA, which connect them direct with the flange of the motor casting, relieving the aluminum crankcase of working strains.

THE OILING OF THE CRANKPINS

Oil is sent from the bottom of the crankcase to the two end bearings of the shaft by means of a gear pump and the oil leads H. From each of these bearings it must then be sent to two of the crankpins, and this is done as follows; The oil which gets to the outside of the bearing bushing under pressure is gathered in an eccentric ring oiler or gutter G by centrifugal action, the gutter being attached to the outside of the crankarm, and at the point farthest from the shaft axis two holes are bored in the gutter registering with conduits J1, J2, bored in the crankarm and crankpin. One of these conduits takes the oil to the middle of the surface of the first crankpin, the other goes through to

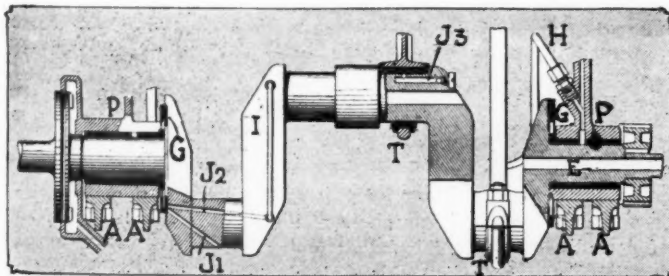


Fig. 1—Centrifugal oiling system for Delahaye 4-cylinder crankshaft

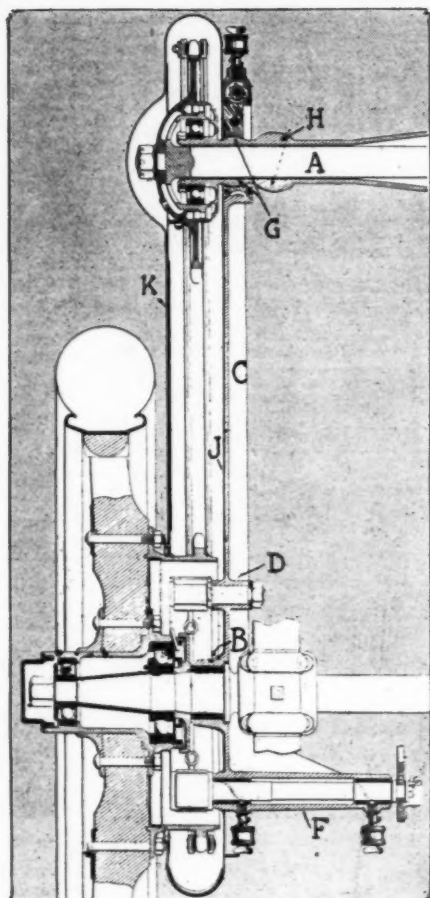


Fig. 2—Chain case and parts on which it is mounted, shown in section

taken, and when the oil is thrown out against the ring from the shaft bearing it gathers equally on both sides of this partition, assuring the same quantity of oil for each of the two conduits.

The overflow of oil from the crankpins which is scattered centrifugally in the crank case serves for the lubrication of the camshaft, the cylinders and the pistons. The latter carry a piston ring near their lower ends to obviate excessive cylinder oiling.—From *La Vie Automobile*, July 20.

Charron's Chain Case Construction—The requirements of a chain casing are that it shall be dust, oil and water-tight, shall not interfere with the adjustment of chain tension, shall be substantially attached and neither vibrate or rattle, shall allow easy access to the chain for lubrication or replacement and shall accommodate itself to all the displacements to which the rear axle is subject without resisting them, suffering from them or ceasing at any moment from functioning as a protector of the chain. It is generally believed to have been shown by experience that in order to do all these things lastingly it must be rigid in itself but not quite rigidly mounted; also that it cannot be successfully made as an accessory adaptable to different constructions but must be designed especially for each type of car.

The design shown in Figs. 2 and 3 refers to such a special construction intended for Charron cars. The casing is mounted upon the radius rod, and this, which is of course also the chain adjuster, is of the special design illustrated in Fig. 3. Upon this departure from earlier methods the general interest in the construction principally depends. The radius rod C is pressed from sheet steel and is of flattened U-section. The large annular flange B near its rear end, which is lined with a bronze bushing, is journaled upon a bearing surface formed for this purpose upon the rear axle. The front end is formed as one-half of a collar, to which the corresponding other half is bolted when the mechanism is assembled. At the two sides of the rear-axle flange

are smaller flanged apertures, D and F, one holding the pin upon which the brake shoes are pivoted and the other constituting a long bearing for the shaft by which the brake cam is forced against the free ends of the shoes. The four arms of the radius rod serve for the permanent attachment of a flat piece of sheet steel J, which forms the back of the chain case.

The collar at the front end of the radius rod clasps an eccentric disk which is formed of two halves pinned together upon the stationary tubular housing of the jackshaft A, the bore in the disk being concaved to fit a ball-shaped bearing G on this housing. A larger ball formation H on the same housing where it passes through the frame reach admits of some compensating action between the jackshaft and the vehicle frame when the latter is twisted. The middle portion of the circumference of the eccentric disk is cut with helical gear teeth with which meshes a worm mounted vertically in the collar of the radius rod and ending in a squared key, so that it may be turned with a spanner. A grease cup sends lubricant to this chain-adjustment gear by which the rear axle may be pushed back to make up for lengthening of the chain and which thus presupposes shackled suspension of the rear springs at both ends. The socket joint at the front end of the radius rod is, of course, intended to permit those misalignments which follow with the action of the vehicle springs when one of the rear wheels is raised higher from the ground than the other and to do this without setting up torsional strains in the radius rod or the chain case attached to it.

The flat plate J which is riveted to the radius rod has a narrow flange at the top and bottom and around its circular rear edge, and to this flange the main and rear part of the chain casing is secured by screws. It is made of thin sheet steel in two halves, which overlap along the dividing central line, and the fit around the brake drum is safeguarded by a packing ring. This portion is not intended to be removed unless the wheel is taken off, as all adjustments and the lubrication, as well as repairs of chain links, take place at the front part, which is separate and removable without effort. It extends from the middle vertical line through the collar with the eccentric, so far to the front that it can always be in the same position irrespective of the chain adjustment. The opening at which the chaincase is passed over the front chain pinion is completely covered at the back by the collar and the eccentric, and the back plate of the front portion of the casing fits up against this collar, while its curved-over edge can be sprung into the similarly curved-over edge of the main portion. A semi-circular cut-out in its face plate in conjunction with a similar semi-circular cut-out at the front edge of the main portion of the casing constitutes a circular opening corresponding to the location of the chain pinion, but this opening is covered with a saucer-shaped hood which at one-half of its circumference is riveted to the face plate of the detachable front portion of the casing—allowing the convex spider of the chain pinion to project into its curvature—while its rear edge is free and is passed under the edge of the semi-circular cut-out in the face plate of the main portion of the casing, against which it fits snugly. Above and below this bell-shaped cap, two clips secure the front face plate of the front portion of the casing to the face plate of the main portion. When access should be had to the chain for any purpose, these clips are unfastened and the whole front is drawn forward together with the cap. In this manner even the replacement of the chain pinion may be effected without dismounting the chain casing or removing any other part than the front lid, as it might be termed.—From *La Vie Automobile*, July 13.

New Power Formulas—Owing to the general adoption of a lengthened stroke in French automobile motors and to the general advancement in design by which the efficiency of motors has been greatly increased, especially at high motor speeds, the need of new formulas for calculating motor power has been felt by the French government, with a view to establishing a scale for the taxation of automobiles somewhat in accordance with the power actually at disposal in the various vehicles, and for the

purpose of arriving at such suitable formulas the co-operation of the technical committee of the Automobile Club of France was invited. This committee gathered data from the manufacturers relating to 95 different motors intended for pleasure automobiles, including 74 4-cylinder, 11 2-cylinder, 4 1-cylinder, 5 6-cylinder and 1 8-cylinder motors, besides 14 motor truck motors. In these data measurements of bore (D) and stroke (L) in millimeters are supplemented by test figures representing the horsepower (P) at a given number of revolutions per minute (w), to which corresponds in each case a certain linear piston speed (v) given in meters per second, and a mean effective pressure (p) which is calculated in kilograms per square centimeter. All the figures applied to motors of 1911 manufacture, and they were found to represent so many variations in design and working results that a division into four classes was called for. The division was made according to the linear piston speed of which the mean effective pressure is normally a function, and these factors, v and p , are therefore not represented in the formulas themselves. A division according to cylinder volume had first been found to result in the need of too many classes. The classes proposed were (1) ordinary automobile motors with piston speeds up to 6 meters, (2) automobile motors with a piston speed above 6 meters, (3) truck motors in which the mean piston pressure averages 5.8 kilograms, and (4) aviation motors in which the piston pressure is abnormally high.

By comparison of the dimensions and other figures given for the motors in each of these classes with the test figures relating to angular speed and horsepower which the manufacturers had guaranteed to be correct, the committee evolved four formulas rating the motors according to bore, stroke and angular speed and differing only in the numerical coefficient. Denoting the number of cylinders by n , the horsepower rating is obtained by

$$\frac{D^2 L w}{10^8} \times \frac{n}{2} \text{ for class 1, with } \frac{n}{2.9} \text{ for motors of class 2, with } \frac{n}{1.8} \text{ for class 3 and with } \frac{n}{1.6} \text{ for class 4.}$$

These formulas were submitted to the government committee under the ministry of public works with the expectation that this body would endeavor to unify them into a single formula for taxation purposes.—From *Bulletin Officiel*, June.

Errors in Motor Testing—The apparatuses used for measuring the power of a motor are nearly always either the (1) Prony brake machine or (2) the Renard mill. In the case of the test by brake one reads off the torque and the number of revolutions per minute and deducts the horsepower from the formula

$$P = 0.0014 w.f$$

in which f is the number of kilograms placed on the end of a scale beam 1 meter in length and w is the number of revolutions.

With the Renard mill the motor power is measured by the resistance of the atmosphere to the rotation of the bar and the planes it carries, and the formula

$$P = aC \left(\frac{w}{1000} \right)^3$$

in which C is a constant determined by the position of the planes upon the bar and a is the weight of a cubic meter of atmosphere at the moment of the test. To simplify matters, tables have been compiled giving values for P at any number of revolutions for a barometric pressure of 760 millimeters and for a temperature of 10 degrees C., and, if the barometer and the temperature differ from these figures, corrections corresponding to the differences are read out of another table and are applied. The result is taken as an exact expression of the motor power.

If, however, a comparison is made between the figures obtained by these two methods of measuring, or even if a comparison is made between two tests made by the same method on two different days, or at two different hours of one day, the figures usually disagree, and it is customary to say that the motor power varies.

Nothing could be more erroneous. It is admitted and seems indisputable that, for the same motor and other things being equal, the power must be proportionate to the weight of the explosive mixture in the cylinders; in other words, to its density. And, in fact, it has been demonstrated by the systematic experiments of Sainturat that a motor loses 16 per cent. of its power when taken from sea level to an altitude of 1,000 meters, which means a difference of 90 millimeters in barometric pressure, the influence of temperature being ignored. When the power of an explosion motor is stated there should therefore be added: With a barometric pressure of 760 mm. and the thermometer at, say, 10 degrees C.

But in the case of brake tests no account is taken of these factors at all, with the result that two tests, of which one is made in the summer with the barometer at 735 and at a temperature of 45 (which is not rare in a testing room in summer) and the other outdoors in winter with the barometer at 780 and the thermometer at 5, vary widely.

When a Renard mill is used the results are still worse, for it is the invariable custom to correct the reading according to the barometric and the temperature conditions, and, in doing this, one falsifies doubly the final figure instead of correcting it. In reality it is the first reading which is substantially right, as will be perceived from the following:

With this style of brake which acts against the air, the torque and consequently the motor power is, other things equal, proportionate to the density of the air in the laboratory, since the resistance to the rotation of the planes grows with this density. But the weight of a cylinderful of explosive mixture is also proportionate to this density and grows with it. The correction relative to the state of the barometer and to that of the thermometer consequently makes itself automatically, and when the reference table has been established for a barometric pressure of 760 and a temperature of 10, by means of a dynamometric scale, the first reading from the table gives under all circumstances the power of the tested motor as it would be for the conditions expressed in these figures, provided of course the motor is an internal combustion motor.

It may not be strictly accurate that the power of the motor grows with the density of the explosive charge and that the variation in the latter compensates with exactness for variations in the density of the outside air which is beaten by the planes of the testing apparatus, but the error, if any, falls within the tolerance allowed for experiments, and in practice it may be said that:

(1) The gross reading given by a Renard apparatus gives without correction the true figure for the power of an explosion motor for certain atmospheric conditions accepted as standard, and

(2) The gross result given by a Prony brake test should be corrected according to the conditions of the atmosphere before it can represent the power of a motor under the conditions accepted as standard.

In other words, one should do exactly the opposite of what is customarily done. Then the final results will be found to bear comparison, as the author has found by practical tests.—A. Colmant in *La Vie Automobile*, July 20.

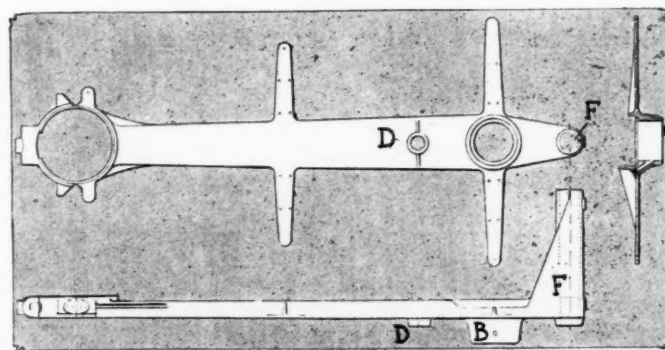


Fig. 3—Radius rod designed as foundation for Charron's chain case

The Warning Signal: Its Care and Repair

Importance of Maintaining Efficiency— How to Keep Motor-Driven, Vibrator and Exhaust Horns in Condition

Diagnosing the Troubles Peculiar to Each Type, and How to Apply the Proper Remedies

A TRIP through the testing and repair department of a manufacturer of warning signals would teach any automobilist a lesson of lasting value. If he could stand at the elbow of the factory expert and watch him at work with no tools but a screw driver and a small brush putting into perfect condition within five minutes' time horns which have been sent back to the factory as useless by car owners his eyes would begin to open. If he could see the letters of condemnation on perfect electric horns which would not operate because the batteries were run down and the owner did not know the seat of the trouble he would be still more surprised, and yet this and many parallel cases are the experience of all the large warning signal makers.

The study of the care of warning signals other than the bulb horn may be divided into three classes: the electric motor-driven horn, the vibrator horn and the exhaust type. The first consists of a motor with rotating parts, the second works on the well-known buzzer principle and the third are whistles of different styles which are blown by permitting the exhaust gases to pass through the proper channels.

In studying the repairs on each type of horn a representative make will be taken and fully described in detail and where radical differences are noted in other horns they will be mentioned.

Klaxon Troubles and Their Cures

More than 75 per cent. of the Klaxon horns returned to the factory for repairs have been damaged because the owners have neglected to attend to their lubrication. Short circuits claim the next largest share, about 20 per cent. of the total, while 5 per cent. of the repairs are miscellaneous.

Once every month the bottom plate should be removed and the commutator surface cleaned with a small brush dipped in

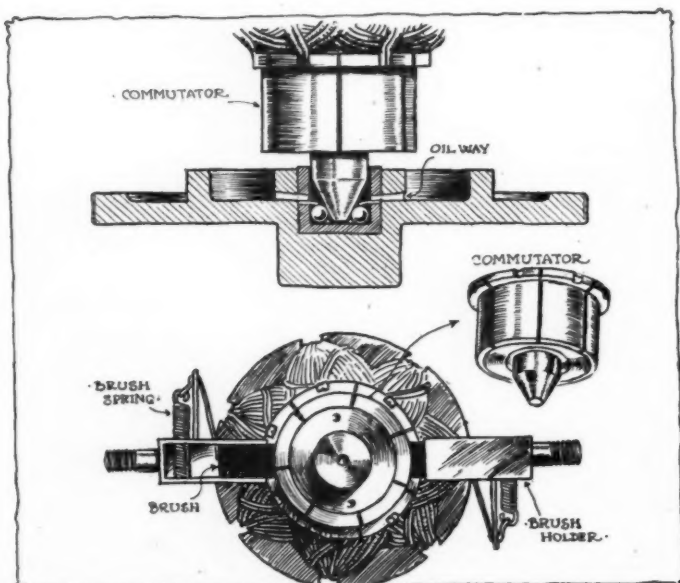


Fig. 1—Parts of Klaxon requiring owner's attention

gasoline. A light film of vaseline or non-fluid oil is then applied to the commutator. The results of the neglect of lubrication are a decided falling off in the volume of sound which will take place in the early stages. After a month's use a black carbon deposit frequently gathers on the commutator surface and can be removed as stated. After a short time the carbon brushes become glazed and the motor will not run satisfactorily.

When any trouble develops with a Klaxon the first thing to do is to remove the bottom plate and see if the commutator is dry. If so, the treatment with gasoline and vaseline will restore it if improper lubrication is the only trouble.

Short circuits in the Klaxon can be roughly divided into two classes: those in which the current passes to the horn casing and those in which the short circuit is in the commutator. If the bottom plate is removed and it is noted that the commutator is sufficiently lubricated and has not become dirty, the probabilities are that there is a short circuit. This can be found by first connecting one of the wires to a binding post and then touching the other along the casing. If a spark is noted it signifies that there is a short circuit to the casing. If there is no spark the other binding post may be tried with the casing grounded. When a spark is detected at either of the binding posts with the casing grounded the trouble will be found in a leaky insulation at the point where the binding post giving the spark passes through the casing. The washer at this point will have to be renewed unless the interior wire be disconnected, in which case the connection will have to be remade.

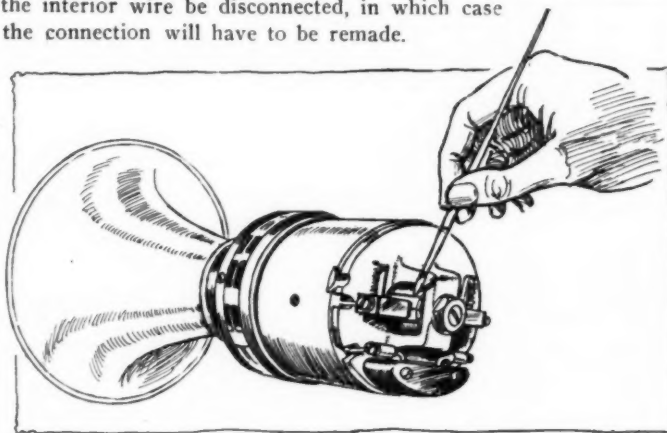


Fig. 2—A drop of oil here helps the Sireno

If the short circuit is not found in the casing, there may be one in the commutator. This can be found by slipping pieces of paper between the brushes and the commutator, grounding the casing with one wire and then trying for sparks with the other on the commutator. This is a matter of factory repair.

Motor-Driven Horns Require Oil

Several horns have been returned, where the owners have permitted the motor to run dry or have failed to operate owing to too tight an adjustment so that the motor was stalled and the owners have then tried them on a current of high voltage. In several instances a 210-volt lighting circuit has been put through the instrument and as a result the whole armature winding blown to pieces. Repairs for the burning out of the motor owing to the use of too high a voltage must be done at the factory. Many Klaxons are in use with the adjustment on the rotor too tight. This consumes much unnecessary power and at the same time cuts down on the sound efficiency. The rotor shaft passes through an eccentric bushing which, when turned around, controls the distance between the toothed wheel and the diaphragm anvil. When the wheel is too close to the diaphragm the latter is bent back, thereby reducing materially the distance through which it can vibrate in the first place and secondly opposing a resistance to the motor which may be so severe that it will stall. A stiff sound that cannot be mistaken when heard will appraise the vigilant automobilist that the adjustment is too tight. The correct note of the Klaxon involves what the

makers call a tiger after the main note. It is a dying-away sound that is familiar to all those who have heard this signal. When the adjustment is too tight this "tiger" disappears. To make the correct adjustment if the sound is noticeably loose or tight, loosen the hexagonal lock-nut, located between the top of the motor and the diaphragm casing, by turning from right to left. Start the current rotating the motor until no sound is heard. Start at this point and turn the motor back slowly in either direction until the note is loud and clear. Set the lock nut, turning up tightly and being careful not to alter the adjustments just made. The note should be clear with a distinct "tiger."

It will occasionally happen that a very ragged sound will be given by the Klaxon. Unless it were known where to look for this trouble a novice might search a week without finding it. The two springs which hold the brushes against the commutator will sometimes be of unequal strength. When this occurs the sound of the horn is materially affected and as a result the ragged sound just mentioned is heard. It is very readily distinguished from the correct clear note. The cure is effected by bending back with a screw driver the spring which seems to project farther than the other. This is of course done with the bottom cover plate removed. It may be necessary to bend the spring back several times before the correct balance between the two screws is reached.

A rather weak sound, also of a somewhat ragged nature, is heard when the two brush springs are on the same side of the brush. Looking towards the outside of the commu-

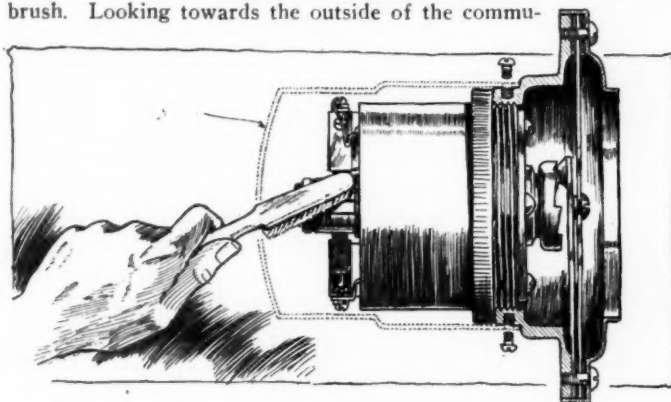


Fig. 3—Remove cover A, to reach commutator

tator with the brushes vertical, the upper spring should be on the right of the upper brush holder while the spring is to the left of the lower brush holder. The spring can be turned about with a screw driver after the bottom plate is removed.

Broken Parts Need Replacement

Some of the instruments returned to the factory for repairs come back because the owners have broken the screws either of the binding posts or of the commutator shaft. The remedy for breakages of this nature is obviously in replacing the broken parts. One broken or loose part which can be found by the horn giving forth a rattling sound is the anvil on the diaphragm. The toothed wheel strikes against this anvil which is riveted to the diaphragm. When the anvil is loose the diaphragm ceases to be positively driven and as a result the rattling sound is heard.

The current consumption of the signal should be watched at times. If the horn is in good condition it should draw from 6 to 7 1-2 amperes at 5 1-2 volts, while the Klaxonet should take about 2.4 amperes. If either of these instruments should draw a noticeable amount more current than what is required the car owner should send it back to the factory. It will occasionally happen that there will be a short circuit through several windings of the armature and that the efficiency of this will thus be materially cut down. This is immediately shown on the ammeter and is something which has to be taken up at the factory before satisfactory repairs can be guaranteed.

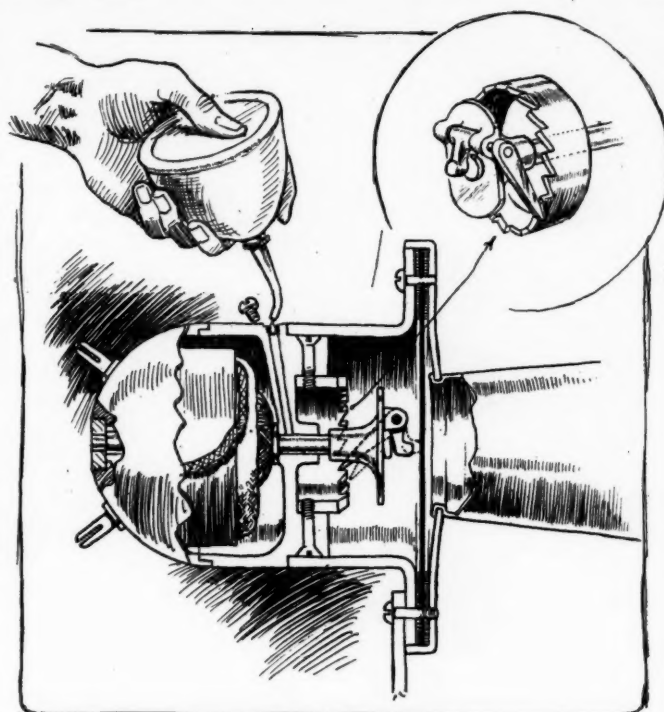


Fig. 4—Typhoon horn must be clean

All these difficulties, however, except the neglecting of the lubricating system and perhaps a slightly mal-adjusted rotor, are rare as compared with the number of times that the horn is suspected when the trouble really lies in the fact that the batteries are exhausted. If the batteries are kept up to the proper strength, splices in the wiring carefully made and two drops of cylinder oil put weekly into the oiler on the top of the case, there should never be any difficulty. The oiler takes care of the ball bearings in the cover plate which carry the shaft of the commutator.

Typhoon Horns Must Be Clean

What has been said regarding the care of the Klaxon could well be repeated in reference to the Typhoon horn. This excellent signal will suffer from a lack of oil in the same manner as any other motor. As may be seen in Fig. 4, special provision is made for oiling the shaft of the motor by removing the screw in the side of the case and allowing a drop of oil to flow down the channel depicted in the illustration. The bearing points are shown in the sketch so that it should be an easy matter for anyone to appreciate where the oil is needed. According to the makers of the Typhoon horn, the greatest trouble they have is that some of the users neglect to renew the dry batteries after they have once become exhausted. The same applies to storage batteries where they are employed. The tone of the horn will become weaker and weaker when the batteries are beginning to run out. A temporary cure for this lies in turning the contact screw on the back of the horn a short distance to the right. This will bring the contact points together and result in a louder tone for a short time. After a while, however, the tone will again run down. When the loudness of the note starts to diminish it is better to have the storage batteries recharged at once or, in case dry batteries are used, to renew these without delay.

Water will often get into a horn and rust the diaphragm, especially if used in the country near sea level. This may be replaced at a very slight cost and a better tone will result. The rusty diaphragm will give forth a heavy sound which is very much unlike the clear, penetrating note of a properly adjusted and clean horn. To remove the diaphragm, take out the small set screws which pass through the flange at the end of the projector and lift off the latter by a straight pull. This will expose the diaphragm, which can be taken off and replaced with

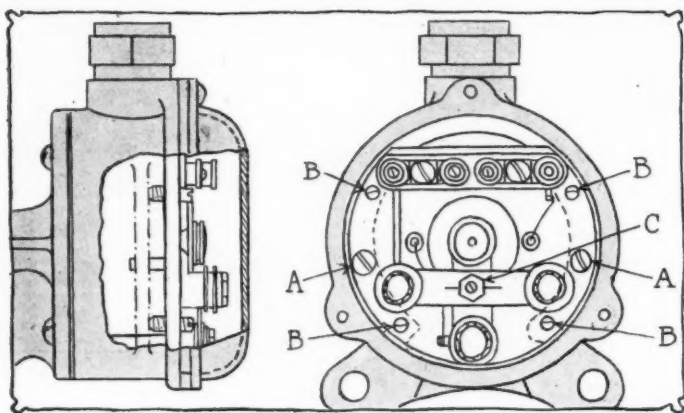


Fig. 5—Points of adjustment on Holtzer-Cabot horn

a new one at very small cost. Washers are put above and below the diaphragm to hold it away from the metal as shown in the illustration. These must be carefully replaced when the new diaphragm is inserted or the tone of the horn will be destroyed and any water that works its way into the horn when the car is being washed or is out in a rainstorm will get into the electric motor and wet the wiring, thus causing a short circuit; as the windings on the armature are not calculated to withstand the effects of moisture cleanliness should be the keynote in horns of this type and the same precautions should be taken as have been enumerated for the Klaxon.

Care of the Newton Signal

The same directions will apply to the Newton horn, another typical motor-driven warning signal. For cleaning these signals a toothbrush is a useful article. It should be dipped in gasoline and applied to the point shown in Fig. 3. The brushes become glazed if they are not cleaned occasionally and this insulates them from the commutator either wholly or partially so that the efficiency of the signal is destroyed. A little gasoline once a month will alleviate this and will keep the signal loud and clear. To remove the cover of the Newton horn, this part being shown by the dotted lines in the illustration, it is only necessary to remove the little screws which are shown lifted from their position in the sketch. What has been said concerning proper battery strength on the other horns can be said regarding the Newton as well as every other electric horn whether it be vibrator or motor-driven. A periodical inspection once a month of batteries and horn will keep them always in good condition. It will not take long; the only steps necessary are the removal of the cover and the brushes and then the use of the tooth brush with a little gasoline. Once a season some light grease should be applied to the ratchet behind the diaphragm. This can be reached by unscrewing the motor and removing it from the body of the horn. To adjust the sound to its desired pitch the motor is either screwed in further for a heavier sound or backed out for lighter sounds. When replacing the brushes care has to be taken that a substantial connection is made between the wire and the brush holder, as a poor connection here would result in an absolute failure of the horn in case the wires were shaken off the binding post.

Very similar in appearance, though in reality an entirely different type of horn, is the Sireno. When the cover is removed the commutator and brushes are exposed to view, as may be seen in Fig. 2. The directions as to keeping the horn clean at these points and maintaining the proper voltage in the batteries which are used for the purpose of driving the motor in the horn are exactly the same as for the other types of motor-driven horns which have been previously taken up. Repetition is unnecessary, although it may be said in passing that the diaphragm of this horn, being of an entirely different shape on account of the siren principle upon which it acts, needs different treatment. The diaphragm in this case rotates, the sound being

given by a number of vanes in the diaphragm which send the air through perforations in the housing of the horn. These vanes and perforations should remain open and clean in order that the horn will reach its full efficiency, for the sound depends upon them to a great extent. They are not very apt to become clogged if the horn is mounted high, but should it be on the lower part of the car in reach of splashing mud, this warning should be borne in mind.

A point which the makers of motor-driven electric warning signals have found difficult to emphasize to a sufficient extent to cause the users to heed the advice is the matter of wiring. In the first place a set of at least five dry cells should be used with all these signals. They all work best with a six-volt current. But the mere connecting of five 1 1-4 volt cells in series will not assure the operator that he is going to get a current of proper strength at the horn. The wire must be large enough to carry the current, the connections must be perfect in order that there be no resistance of any importance in the circuit. Each poor connection will cut down the voltage to a remarkable extent and where one is dealing with a current of 6 volts to

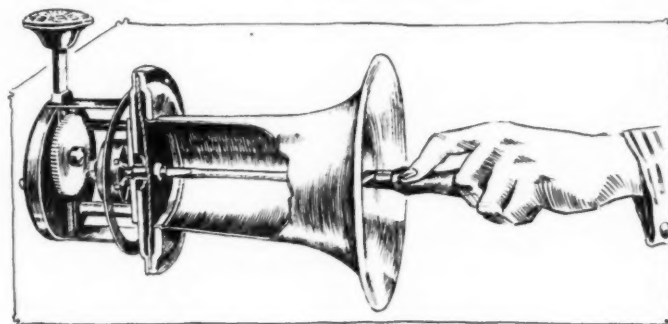


Fig. 6—Showing tone adjustment on the Long horn

start, it is an exceedingly easy matter to allow this current to drop to 3 volts by the time the horn is reached. Protected wire should be used, as there is always more or less chafing against projecting parts, and when the car is running rapidly for a distance it does not take long to penetrate the toughest insulation. It is always a good thing to have the battery near the horn. The loss of current between the cells and the horn will then be minimized. The button operating the horn should be placed so that it may be reached without taking the hands from the steering wheel. Obviously the placing of the horn button on the steering wheel is the most logical solution of the problem of finding a place where the electric horn can be operated at an instant's notice.

In summing up the care of motor-driven electric signals the following directions should be kept in mind: Keep the commutator clean by using a little gasoline on a brush once a month; a touch of vaseline on the commutator once a month will keep it in good condition; see that the internal connections do not permit of a short circuit within the instrument; do not use a higher voltage than the maker recommends; keep the sound adjusted to a proper pitch, in most motor-driven horns where the adjustment is too tight an unnecessary amount of current is consumed; see that both brushes bear equally hard against the commutator; make careful wiring splices; maintain the proper battery strength.

Caring for Vibrator Type Horns

Electric horns of the vibrator type are simple and efficient. They work on the same principle as the buzzer, a magnetic vibrator action actuating the diaphragm and thus producing the sound. The Tuto horn is an example of the vibrator type and is very representative of this class of horn. The mechanism is shown in diagrammatic form in Fig. 8. There is but one moving part and that is the armature. It is designated by the solid and dotted lines which show the path through

which it moves. As may be seen, the armature is supported on a solid spring, which through its natural action allows the moving armature to impart a hammer blow to the rod reaching to the diaphragm. Each time the diaphragm is struck a sound is sent through the projector of the horn and the only thing necessary to maintain a solid stream of sound is to have the successive blows upon the diaphragm produced in sufficiently rapid succession. This is accomplished by the electro-magnetic or solenoid coil shown in the illustration. As the battery circuit is closed the current flows through the contact points and coil, magnetizing the bar of soft iron that is enclosed in the coil. The magnet attracts the armature sharply towards itself and causes the blow to be struck on the diaphragm stud as just described. In pulling the armature towards the diaphragm, the connection at the contact points is severed and the circuit is broken. The soft iron core is demagnetized and the spring causes the armature to fly back to its original position, again closing the circuit and allowing the same cycle of events to again take place.

How to Adjust a Vibrator

With this explanation of the mechanism of the Tuto horn and all others of the vibrator type, it may be perceived that the factor of lubrication does not enter into this class of horn. There is one point, however, which will require adjustment from time to time. This is the contact screw, which has been specially designated in the illustration, Fig. 8. The screw is held securely against turning under the vibration of the car by a clamping screw which must be loosened before any adjustments can be made. This can be done with an ordinary screw-driver in a few minutes' time. Usually a quarter turn of the contact screw in a clockwise direction will be all that is necessary to compensate for the wear of an entire season. When this has been done the pressure of the push button will indicate whether

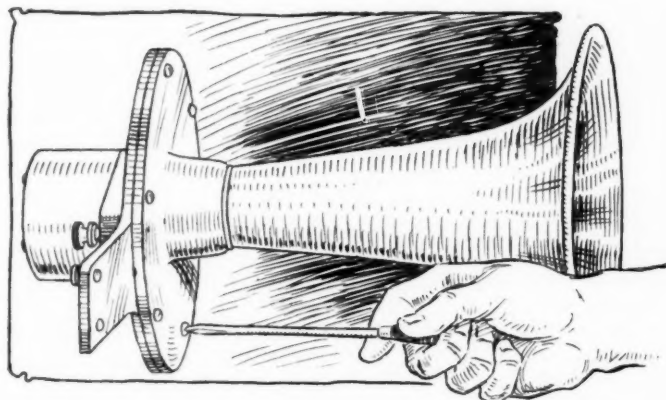


Fig. 7—Removing diaphragm from the Onelta vibrator

the adjustment is correct or not by the tone which is given forth. The low tone of the horn should be given instantaneously on the slightest pressure of the horn button, while the loud tone which is given when the button is fully depressed, should be smooth and clear as compared to the ragged tone noticeable with an incorrect adjustment.

The stud which transmits the blow of the armature to the diaphragm is fitted with an adjusting device which is more useful to the factory assembler than to the owner of the horn, for after it is once set at the factory there is hardly ever any necessity for the owner to touch it. The office of this adjustment is to regulate the length of the stud so that it is impossible for the armature to strike the pole pieces of the magnet. When this happens it is easily noticeable because the armature fails to produce a loud clear note, a ragged tone of very little penetration and loudness resulting. The adjustment is made by turning up or down as required, the hexagonal nut located on the end of the rod making the rod longer or shorter.

In the case of vibrating horns as well as for the motor-driven type it is well to get after the current consumption from time to

time with an ammeter. Each horn is designed to draw a certain amount of current and when the current taken is above that quantity the reasons should be found, for not only is the horn costing more money to operate than it should, but it is no doubt delivering a tone which is not as efficient as it would be were the defective points corrected. Besides this, in most cases where too large an amperage is drawn, the life of the instrument is seriously threatened as matters go from bad to worse. The Tuto horn is designed to take not more than 1 ampere on the low note and not more than 2 amperes on the loud tone. A little less than this should be registered on the ammeter for either the loud or low tone, as these are the maximum allowable consumptions. When the amperage becomes high look at all connections and see that they are perfect; see if the contact points are adjusted properly and that they are flat and not ragged. A few touches with a fine file can easily regulate this.

A vibrator horn which has been carelessly constructed can give a great amount of trouble in spite of its simplicity. This statement is uniformly agreed to by the experts in the manufacturing plants of the better class of vibrator horns. The greatest trouble will be caused by the use of poorly selected or cheap materials. Some points which must be watched carefully can be here taken up.

The sticking of the contact points after the horn has been used for some time is often caused by the welding action of the heat generated by the electric arc which is drawn between them. Unless special precautions are taken at this point by using special metal which will not be so apt to soften materially under the influence of the current the operator will be surprised to note the sudden failures of the horn to work. Where good material is used, as in the several well-known vibrator horns now on the market, the hot electric arc instead of welding the points together will clean out the deposit of foreign material from between the points. Nevertheless these points should be kept clean by the owner of the horn for there will always be a deposit remaining even when the carbon is burned off the points. The inability of the vibrator horn to maintain its adjustment shows that the particular type of horn which gives this trouble has poor material in the contact points, and when this is noticed it may just as well be discarded. In the better types of horns there is sufficient contact material to last as long as the best cars if the adjustment is made occasionally. Wear is taken care of in the Tuto horn by the screw designated in the sketch. Other horns of the vibrator type all have some similar means of taking up what wear occurs in the contact points.

Monoplex Also Has Vibrator

There is no excuse for the breaking of springs in horns of this type, and cases of this kind occur only in the poorest horns. When it does happen the only remedy for the trouble is to buy a new spring and fit it in place. Where a spring should break in a vibrator horn, however, the purchaser should demand a new instrument. Cases of this kind never happen with the better grades of horns, and it is after all a matter of economy to purchase the best in this line, as the horn is an

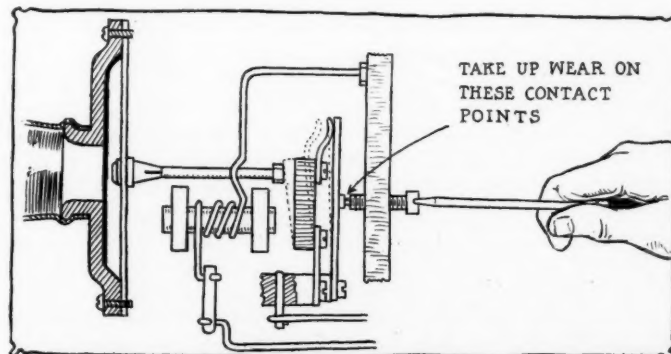


Fig. 8—Diagram of Tuto horn, showing contact adjustment

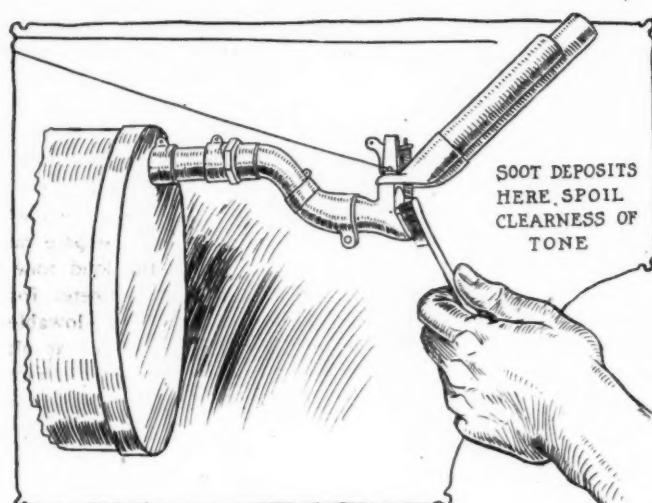


Fig. 9—Point to watch on Waymaker horn

accessory which may prove a friend in dire need and failure on its part in some such time may mean disaster. What has been said regarding the breaking of springs may also be noted regarding the failure of the diaphragm to retain its shape. The use of the best metal is necessary here in order to resist the crystallizing effect of the rapid succession of hammer blows.

As in the motor-driven horns, the advice given in regard to one signal applies perfectly to all the others of the same type. The care of the Monoplex horn does not involve any features which are not brought out under the discussion on the Tuto horn. The brass cap on this horn is removed by taking out the small machine screw which will be seen on the side of the horn. The cover can then be pulled off, exposing all the mechanism, which can be taken care of by the owner. No more dissection than this should be practised on any horn if the owner does not desire to find himself in the position of the man who took his watch apart and when he had put it together again found that he had simplified the mechanism by having two wheels left over.

No lubrication is required for a vibrator horn. Most makers do recommend that the user employ a fine sheet of emery paper at the beginning of each season for the purpose of dressing down the contact points and making them flat and clean. This ought not to take anyone more than 5 minutes. After this is done and the contact screw taken up to its proper adjustment the horn should require no other attention during the season. Outside of the horn, however, the batteries and connections must be watched, as has been explained above.

Mesco Horn Has Unique Feature

The Mesco horn is distinguished in the class of vibrating horns for its four independent magnets. The armature is located above these and the vibration is set up in the usual manner by automatically interrupting the circuit. Good connections both within and outside the horn are necessary in order that the action be a success. To inspect the horn remove the four small screws in the cover and lift it off. The whole mechanism will then be open to view. The contact screw need not be turned more than once a season. At this time, however, they should be examined to see that they have worn flat and not round. There is an idea current that the points wear in the same way as a carbon in a lamp. That is, that one point becomes hollow or cup-shaped while the other acquires a point on account of the flow of metal between the two points. This may or may not be true, but the fact remains that the best way to maintain the horn at its best efficiency is to dress these points up at the time of overhauling the car.

The Holtzer-Cabot adjustments which are illustrated in Fig. 5 are like all the other vibrator horns in principle although the arrangement is a little different. Referring to the illustration,

the method of procedure for adjusting the horn for tone and loudness would be to first loosen the screws shown at A, and then moving the plunger away from the diaphragm by turning in the set screws B. Each of these screws should be turned in an equal amount to secure uniform adjustment. The vibrator screw should next be adjusted until the proper speed of vibration is secured. The plunger is then gradually moved up closer to the diaphragm until maximum loudness is obtained. This is accomplished by turning the screws B in a counter-clockwise direction until the desired tone is obtained. To lock the adjustment the screws A are tightened up.

The diaphragm in the Holtzer-Cabot horn, as well as in practically every electric horn made, can be removed by removing the screws which surround it, as shown in Fig. 17, where the Oneita horn, a representative horn of the vibrator class, is depicted. The diaphragm on several of these horns is arranged with a small piece of metal in the center known as an anvil. Should the anvil become broken, bent or loose it is generally necessary to replace the whole diaphragm. This is very readily accomplished by taking out the screws designated in the illustration and lifting off the washers which are placed around the circumference of the diaphragm to hold it in place without metallic contact. New diaphragms are very cheap and are easily installed by simply laying them in place and replacing the screws.

Remove Soot From Exhaust Horns

The Long horn is a vibrator horn not operated by electricity but by pressure of the hand or elbow upon the plunger. The plunger actuates a gear wheel in the interior of the horn; this wheel rapidly revolves, being carried along by a heavy flywheel. The care of this horn is very simple and consists in a simple replacement of any part or parts which should become worn. The teeth on the ratchet of the plunger may be broken by a direct shock to the plunger, but with ordinary care and usage the horn should last as long as the car.

The next style of horn to consider is that operated by the exhaust gases. The Aermore, Jericho, Exo, Gabriel, Nightingale, Apco, and other types of exhaust horn all depend on the pressure of the exhaust gases for their operation. The two greatest problems to deal with in all exhaust horns is to keep them clean and to install them properly. Most of the things which crop up in the care of exhaust horns can be readily cured by means of a small brush and a little kerosene oil. The simplicity of this type of horn and the infrequent attention which it requires are among its commendable points, and the mere knowing how to get at the horn when it is fouled, as they nearly all become if the motorist has been burning too much oil for a long time, will go a long way in preventing trouble from the accumulated deposit.

A toothbrush forms a handy instrument to use in removing the carbon should it be found that the vents are choked with this most troublesome product. As long as the bristles on the

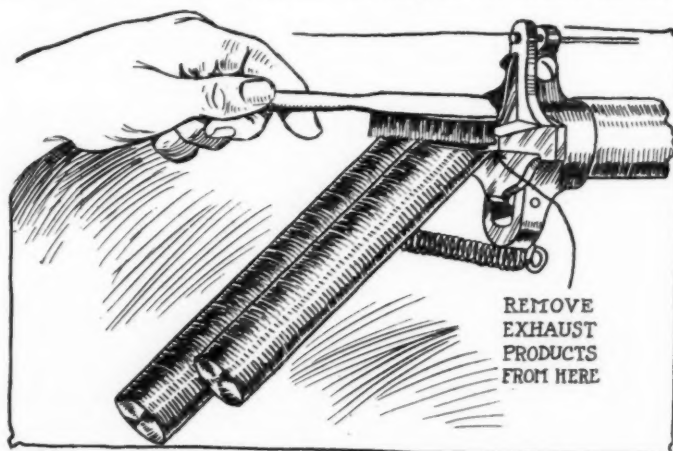


Fig. 10—Kerosene on a toothbrush helps the tone

brush are stiff, however, it will be satisfactory for this purpose. Either gasoline or kerosene will dissolve the products which gather in the pipes.

It often happens that the cut-out valve located in the pipe between the motor and the muffler becomes warped from the heat of the exhaust or seats defectively from some other cause. This will permit a large portion of the gases to escape at this point, and besides being noisy allows the pressure to fall off so far that the sound of the horn is impaired. In case trouble is had in getting insufficient sound it would be wise to thoroughly examine the muffler and its connections. It will very often be found that the joints are loose and that a large part of the gases escape through this means. This will necessarily interfere with the action of a horn that depends for its operation on the volume of the exhaust. In case cables are used in the operation of the horn there is always a possibility of stretching. The slack should be taken up as it occurs in order that there be no lag in the application of the signal.

Never use a file, screwdriver or other hard instrument of a like nature which is apt to bend or mutilate the language plate or lips of such horns as the Gabriel; a stiff brush with kerosene or a quill toothpick moved back and forth through the serrations in the edge of the language plate will restore the natural tone to the horn. Washing this type of horn with water for the removal of dust will do no harm, but the use of kerosene or gasoline is better as these are better solvents.

Jericho Automatic Has Magnetic Device

The Jericho Automatic horn is the same as the Jericho with the added feature of an electric magnet which serves to operate it. The horn, while it is actuated by the exhaust, is operated by a push button which may be placed on the steering wheel or any other desirable place. The electric magnet has a movable plunger attached to the hinged lid of the horn. When the operator desires to give a warning signal he presses the button which closes an electric circuit through a solenoid coil. This lifts the plunger which operates the horn by shunting the exhaust gases through the proper passage. The maintaining of the battery strength and the cleanliness of the horn is about the only care these horns need, except that careful wiring is necessary.

The bulb horn, in spite of its conceded simplicity, requires some care also if it is desired to maintain it in its proper condition. The worst enemy of the horn is water, which often enters while the car is being washed. When screens are used over the horn do not allow them to be caked over with metal polish or mud. Keep them clean.

While many automobilists do not expend much effort on the care of their horns, a little reasoning is bound to bring out the idea that such a course is a mistaken one. A good horn goes a long way toward avoiding accidents on the road and saving the car owner large sums of money which he would have to spend if personal or property injuries are caused by his car.

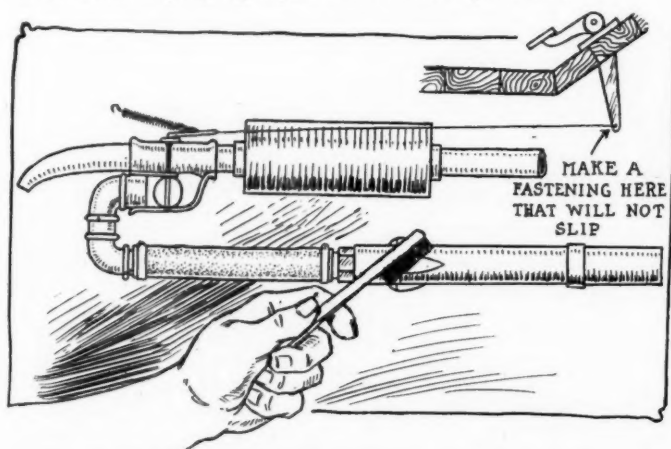


Fig. 11—Gabriel horns are benefited by cleaning occasionally



Fig. 12—Screens over bulb horns must not be clogged

Harking Back a Decade

FROM *The Automobile and Motor Review*, August 9, 1902:

The 100-mile endurance test held under the management of the Chicago Automobile Club last week was one of the most interesting, profitable and important events in the brief annals of western automobilism. There were twenty-eight starters. Only one serious mishap occurred and it was caused by fire which destroyed the Elmore contestant. The course was to Waukegan and return. Nine cars were awarded blue ribbons and the main cup was won by F. X. Mudd's Winton.

October 9 will see the start of the reliability test of the Automobile Club of America. This will allow the tourists to spend Sunday in Boston and start the return trip on Monday morning. The finish is scheduled for October 15. Secretary Butler is formulating rules to cover the contest.

One of the chief lessons learned in the recent Paris-Vienna race was that laxity in the application of the rules concerning controls is a serious matter. The fact of the arrival first at control was given a fictitious valuation and numerous violations of the rules in this respect were noted, especially where some contestant failed to stop at controls and then presented himself at the head of the line for final checking.

Cincinnati has made a sharp market for automobiles this season, despite the hilly topography of their city. There are now ninety automobiles owned and driven in the Queen City.

Details of New Ford Racer

Details of the racer being made by Henry Ford have been given out. The car will have a four-cylinder motor with cylinders 7 1-2 by 7 1-2 inches, designed to be run up to 1,000 revolutions per minute. There is only one speed gear, but by throttling down, it is believed the car can be made to go as slow as 15 miles an hour at 150 revolutions. The maximum speed is problematical. The car is not intended for use on streets or highways.

Orders to sell the factory plant of the Gasmobile Company of America, located at Marion, N. J., have been signed. The unsecured creditors hold claims amounting to about \$170,000.

Members of the Milwaukee Automobile Club have started a movement to train horses to familiarity with the motor vehicle. The plan includes the renting of vacant lots in the city where the horses can take instruction.

William K. Vanderbilt, Jr., recently made a flying mile in 48 2-5 seconds on the road near Chartres, France. This is 3 2-5 seconds lower than the former world's record held by Fournier.



Some Points Regarding Gasoline and Kerosene—Methods of Brazing Hard Metals—Adapting Six-Cylinder Magneto to Three-Cylinder Motor—Diagnosing Throttle and Spark-Plug Troubles—Some Tire Tips—Steering Gear Information

Two Pointers to Remember

EDITOR THE AUTOMOBILE:—I have a 5-passenger car which has given me a great deal of trouble. After having repeatedly balked I decided to thoroughly overhaul it. When I came to the switch block, I found a binding screw loose. The connection wire would fall from one side to the other and in this way would make contact at times.

Then a leak occurred in the gasoline line. In a short time I found that the three screws in the flange of the carbureter were loose. Now I have more trouble. If I run my car any distance and stop for 10 minutes or more, I have trouble in starting again. After filing the coil points, it will run again for a short while.

In a recent issue of THE AUTOMOBILE, a correspondent stated that it would help if the units or the wires were changed. How do you do this? I tried to change the wires from the timing post to the spark post on the coil, and the plug wires to the timer posts, but it would not spark.

Jacksonville, Ill.

J. A. HASP.

—The wires need never be turned around on the vibrator points or any other tampering done if the proper adjustment is maintained at all times. The correct method of making the adjustment is outlined in another letter in this issue entitled, "Motor Won't Throttle Down."

Regarding Hydro-Carbon Fuels

EDITOR THE AUTOMOBILE:—Will you kindly answer the following questions?

1. What is the viscosity of 68-degree gasoline as compared with water?
2. What is the viscosity of kerosene as compared with that of water?
3. What is the accepted chemical formula, or rather the formulas, of the constituents of gasoline?
4. What is the formula or formulas of the constituents of kerosene?
5. I understand one volume of liquid gasoline and about 11,000 volumes of air make the highest explosive mixture. Is this correct?
6. What relative volumes of liquid kerosene and air form the most explosive mixture.
7. What temperature is the boiling point of gasoline?
8. What temperature is the boiling point of kerosene?
9. How many B.t.u. are in a gallon of 68-degree gasoline?
10. How many B.t.u. in a gallon of kerosene?
11. What is the average specific gravity of the kerosene now obtainable?

Owensboro, Ky.

A. READER.

—The following are the approximate values which you desire:

- (1) 0.8; (2) 2.5; (3) C^7H^{18} ; (4) $C^{12}H^{26}$; (5) Yes; (6) 1 to 13,000; (7) 120 degrees Fahrenheit; (8) 300 degrees Fahrenheit; (9) 124,000; (10) 134,000; (11) From .800 to .806.

For Brazing Hard Metals

EDITOR THE AUTOMOBILE:—Would thank you for the following information: What is used for brazing hard metals such as cast or other hard chilled metals?

Donnellson, Iowa.

W. J. SCHMITT.

—The method employed with such metals first thoroughly clean by scraping and filing the two surfaces to be brazed together. Borax is then brushed on the surface to prevent oxidation. The parts to be joined are then pressed tightly together and the heat applied by means of gas flame in a built-up brick oven or any other method the repairmen desires to use. Where the joints do not have to stand a heavy strain use four parts copper and three parts zinc for your spelter. If considerable strain is to be borne, use three parts copper to one part zinc. For average work use equal parts copper and zinc.

Can Use Six-Cylinder Magneto

EDITOR THE AUTOMOBILE:—I have a three-cylinder, two-cycle engine which has stood some very hard service and have no trouble except with the battery-and-coil ignition system.

I have a six-cylinder, four-cycle magneto. I would like to install and would like your opinion as to whether to run the magneto twice engine speed and use two sets of spark-plugs. What effect would the former have, as I am afraid the latter would run

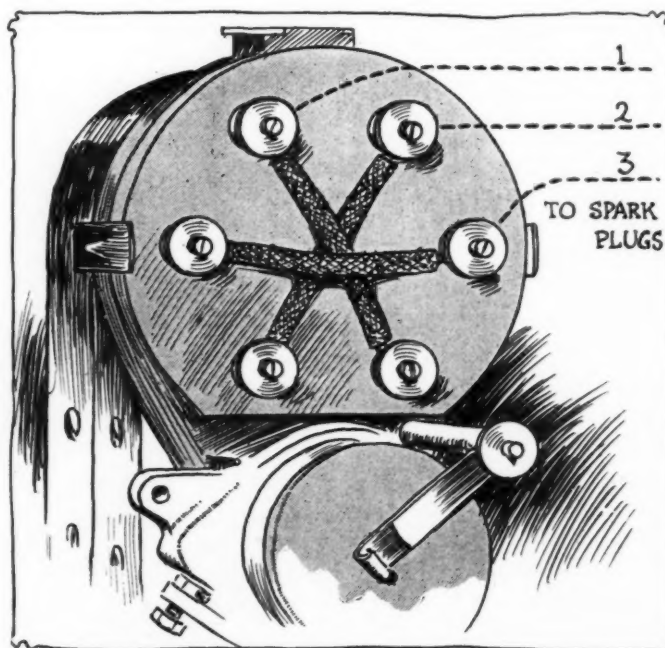


Fig. 1—Cross-connecting points on six-cylinder magneto to adapt it to a three-cylinder motor

the magneto too slowly? Kindly give the information in an early issue of THE AUTOMOBILE.

Chicago, Ill.

L. G. BURKE.

—You can use the six-cylinder magneto by cross connecting the points on the distributor which are diametrically opposite Fig. 1. This will give you three leads to the spark-plugs and you could use three plugs instead of six. The magneto should be driven at 1 1-2 times the engine speed. The gear ratio of armature to distributor is 3 to 1 so that you would get the spark at every 120 degrees which is the correct crank angle for a three-cylinder motor.

Motor Won't Throttle Down

Editor THE AUTOMOBILE:—I have seemingly a difficult problem on my automobile.

A Ford car, No. 34940, model 1911, was always rather hard to start, but by priming carbureter (Kingston), and turning needle valve open a half or full turn, could usually be started except in very cold weather by a few turns of crank. For a few weeks it has been impossible to start it except by injecting gasoline directly into the cylinders. After being started it will run fairly well from fifteen miles an hour up, but if throttled below that point the motor dies. Mechanics here are nonplussed. Ignition has been thoroughly gone over and tested, new batteries, installed, to try and facilitate starting, commutator taken off and cleaned, cylinder head taken off and carbon removed and valves ground. Timing gear was inspected and marks on gears found to correspond. Latter had not been touched since car left factory. We turned motor slowly to see if valves seemed to be properly timed. Previously we tried a brand-new Holley carbureter, and if there was any difference, the motor was even harder to start. When the air was shut off and the engine cranked there would be a suction immediately followed by a blowing out of gas from the carbureter. With the Kingston the spray blows out of the air intake. Have wound intake manifold and saturated with gasoline hoping to detect a leak. No discovery. The cylinder head joint leaks a little oil and water though bolted down tightly, but gasket seems in good condition.

Watertown, N. Y.

A. C. J.

—In the first place the probabilities are that you have the contact points on the vibrator adjusted down too tightly. The screw which regulates the vibrator should be turned down until there is no vibration at all between the two points and then turned up until it just begins to vibrate. After it has reached this point give the screw an eighth of a turn more which will give a light adjustment and one which will not cause the contact points to burn out quickly and will enable you to start without racing the motor. The carbureter adjustment is also possibly incorrect. It must be remembered that the carbureter should give a rich mixture to start and if it fails to do this will always render starting difficult.

Offense Punishable in All States

Editor THE AUTOMOBILE:—Are there any states that make it a misdemeanor, punishable by fine, or imprisonment, or both, to throw broken glass or bottles in public highways? It seems to me that some action ought to be taken in the matter, in this part of Virginia, at least. Motoring is getting to be one continual eye strain to avoid broken bottles that appear to have been thrown in the road for the express purpose of ruining someone's tires. This is a small town, 6 miles from a railroad and we have had running now, about two months, a 2-ton Packard truck that makes the round trip daily between this place and Roanoke, our nearest town, 18 miles distant. The truck carries both freight and passengers, and so far has proved to be one of the greatest conveniences this place has ever enjoyed. I saw, yesterday, a chunk of rubber that would weigh at least 4 or 5 pounds that was cut completely out of one of the dual rear tires by a beer bottle that had been thrown in the road by some hoodlum possibly for that identical purpose.

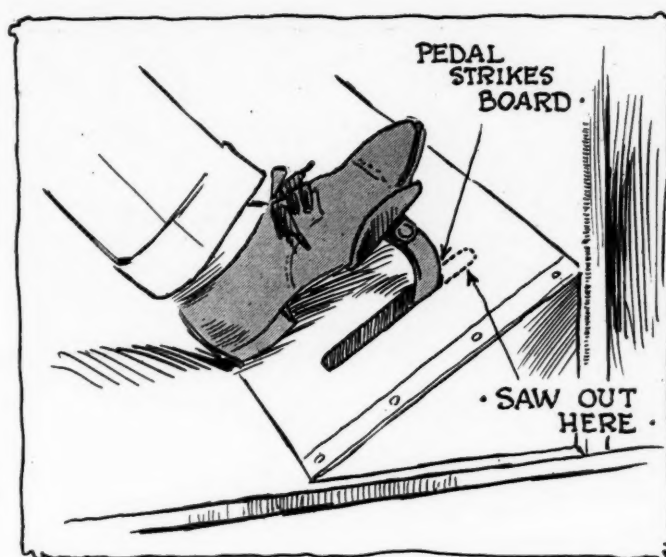


Fig. 2—Cutting away floorboard to allow of free movement of clutch pedal

Surely motorists are due some consideration from the general public and should not be subjected to these needless and costly annoyances.

Fincastle, Va.

E. M. MILLER.

—Even though the offense is not specifically mentioned in the statutes there is some law in any state by which an offender of this nature can be brought to justice if detected.

Had to Cut Away Floor Board

Editor THE AUTOMOBILE:—I saw in a recent issue of THE AUTOMOBILE that you advised a reader to examine the floor board and see if the slot was deep enough to allow him to fully disengage his clutch. As I had the same trouble I looked at the floor board on my car and found that it had to be cut away as shown in the sketch, Fig. 2. It is remarkable how one will overlook the obvious when searching for troubles in a motor car. I had not been able to shift gears satisfactorily because the clutch lagged a little and I could not find the trouble until I noticed it mentioned in your columns.

New York City.

INTERESTED.

One Spark-Plug Gives Trouble

Editor THE AUTOMOBILE:—I have a 1911 high-grade car which has been giving me trouble since I purchased it new about a year ago. The spark-plug in the third cylinder persists in oiling up, while all the others remain perfectly dry and clean. A change of the plugs or the use of new ones makes no difference. A test shows the current to be just as strong on this cylinder as the others. The oiling system is a force-feed and this cylinder receives exactly the same amount of oil as the others. The cylinder seems to fire until it becomes too much choked with oil and then a cleaning out with a little gasoline rectifies it.

I finally concluded that the cylinder might be scored or cracked, and for that reason was letting up too much oil. So the engine was taken down and a new cylinder and rings were put in, but the trouble still remained. Can you give me a possible solution of the difficulty?

Ignition is by Bosch high-tension magneto. No batteries are used. A Hancock oiler with sight-feed to each of the internal case-bearings is used, from which the oil flows through the hollow crankshaft to the connecting rod bearings where it is thrown off and lubricates the cylinders, next to the bottom of the crank case, where it is taken up by splash. The compression on all cylinders seems alike.

Which is the best for the motor; using a mixture as lean as possible, just so there will be no popping back to the carbureter,

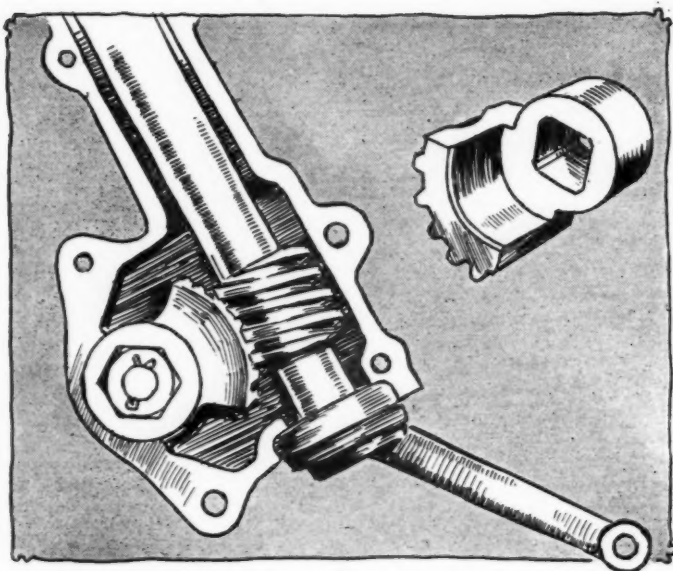


Fig. 3—Illustrating operation of worm-and-sector steering gear

or the use of a mixture which gives a maximum of power.

Round Top, N. Y.

J. F. W.

—You can be reasonably sure that the oil is getting past the piston and working its way up into the combustion space. If a new cylinder did not cure the trouble it would be advisable to get an oversize piston as the fit between piston and cylinder is evidently at fault. Any looseness existing at the lower connecting rod bearing might also cause too much oil from the pressure feed to be thrown up into the cylinder. It would be well to examine this before changing the piston, although the probabilities are that you have an undersized piston which passed the inspection department without being caught.

Skips When Running Slowly

Editor THE AUTOMOBILE:—I have a 4-cylinder motor that skips when throttled down, but runs all right when opened up. Can you tell me the cause?

Worcester, Mass.

W. A. D.

—The trouble is either in the carbureter adjustment or in the magneto. If you will try the car on both the batteries and magneto and see if it skips only on one of the two ignition systems you will eliminate one of the two possibilities. Should the trouble only appear when operating on the magneto you will know that the magnets require recharging, for the spark generated at low speeds is not hot enough to fully ignite the charge. Should the trouble still continue whether you run the car on battery or magneto, you will know that you are not getting a rich enough mixture at low speeds. As you do not mention what make of carbureter you are using it is not possible to advise you how to make the adjustment beyond the fact that the spray aperture should be opened a little.

Asks a Few Tire Questions

Editor THE AUTOMOBILE:—Will you kindly answer the following?

1. Does it do a tire (molded or wrapped tread) any good or harm to use a tire paint?
2. What is the proper size tire to use on a car weighing 4,100 pounds?
3. How much air should they have in them?
4. What is the best way to carry tubes in a tire trunk?
5. Would it do to wrap them in paper?

San Francisco, Cal.

J. JENSON.

—(1) It does not do the tire any damage and certainly increases the good appearance, making the tire look bright.

(2) Anything from a 34 x 4 1-2-inch up.

(3) A pressure of 90 pounds per square inch.

(4) Carry them flat in a box or wrapped in paper and keep them liberally sprinkled with soapstone, graphite or tire talc.

(5) This question is answered under (4).

Some Steering Gear Questions

Editor THE AUTOMOBILE:—In reading over the 1913 car announcements in your paper I find that some cars are using the worm-and-sector, while others are using the worm-and-gear types of steering mechanism. Will you kindly explain the difference between them? I should also like to know what the word irreversible means when used in connection with a description of a given form of steering gear. Is there any confusion on these names?

Tenafl, N. J.

F. H. VARIAN.

—The difference between worm-and-sector and worm-and-gear steering is just exactly as the name suggests. A sector is a portion of a circle while the gear is the whole circle. It is cheaper to make a worm and sector because it is not necessary to cut teeth all around the wheel while the gear has the advantage that when some of the teeth are worn the gear can be moved around and a fresh set brought into action. The two types are illustrated in Figs. 3 and 5 which explain the difference better than words. The word irreversible used in connection with steering gear signifies that the road shocks will not turn the wheels out of the line in which the driver holds them by means of the steering gear. There is no confusion of terms regarding the nomenclature of the steering gear and its parts.

Has an Old 1902 White Steamer

Editor THE AUTOMOBILE:—I have a 1902 White Steamer, seating 5 passengers, and would like to know the following:

1. How many miles an hour was it supposed to run when new?

2. Had it power to run over a sandy road?

3. How many pounds of steam was required to run it?

4. Was that style car a success?

Trenton, N. J.

J. McCORMACK.

—(1) It could go 15 miles an hour over any passable road.

(2) Yes.

(3) It took 300 pounds pressure.

(4) For that time it was a distinct success, especially in that it made use of a condenser which reduced the water consumption to a marked extent.

The greatest success of the White car was reached in the 100-mile A. C. A. run held on Memorial Day, 1902. In this event the consumption of fuel and water were as important as the time spent upon the road and great surprise was occasioned at the small amount of water required to operate the car. At one of the controls the White took on 8-10 cubic foot while the nearest competitor required over 4 cubic feet. The secrets of the success of the White car were the series of coiled pipes which resembled the water-cooling system of a gasoline car and which greatly mystified the officials of the contest until it was discovered that these pipes formed a condenser which allowed the car to operate at a much higher fuel efficiency than had been obtained in any previous car. Dry superheated steam is generated from a boiler which is composed of twelve layers of helically coiled pipes. The temperature of the steam is generally about 800 degrees Fahrenheit.

Horsepower of the R-C-H Motor

Editor THE AUTOMOBILE:—What would be the actual horsepower of an engine with the same bore and stroke as the R-C-H 3 1-4 by 5?

Is the 2-bearing crankshaft as desirable as the 3-bearing shaft?

Wyandotte, Okla.

C. R. S.

—The brake horsepower of the 3 1-4 by 5-inch motor, which was obtained from tests made with the motor driving an ordinary two-blade fan dynamometer at the R-C-H factory, was calculated as follows:

The blades were 10-inch x 14-inch and were set at varying

center distances, and the horsepower developed at a speed of 1,750 revolutions per minute was 26.

This recorded horsepower did not consider the friction loss in the dynamometer driving shaft, which must have been considerable because of its insecure mounting and excessive vibration at high speeds. On account of the impossibility of setting the fan blades close together, it was impossible to run the motor at a higher speed than 1,750 so that the power developed above this point has not yet been determined.

The two-bearing crankshaft is not as stiff as the three-bearing and therefore the extra bearing length in order to eliminate the tendency toward whipping in a shaft of this nature will have to be made up by the increased length of the two end bearings. Where the bearings are of generous length and the lubrication of the long bushing necessitated by this arrangement is adequately taken care of it would be difficult to say that the advantage rested with either. A two-bearing crankshaft in which the bearings were too short would not last any length of time as it would be impossible to hold the correct alignment.

Wants to Become Racing Driver

Editor THE AUTOMOBILE:—I have driven cars over 40,000 miles and desire to become a racing driver. Could you give me any help?

Chicago, Ill.

A. N. J.

—Apply to the Contest Board of the American Automobile Association, Fifth avenue and Thirty-ninth street, New York, for a racing driver's license. You will have to state your experience and answer the questions they put to you. After you have done this and secured your license it is a mere matter of looking for a job.

Plaster of Paris Replaces Confetti

Editor THE AUTOMOBILE:—I have taken great interest in the articles on women drivers, and am therefore sending an account that may be of value to the other readers.

On a 108-mile run, from Camden to Wildwood by the Sea, N. J., only one woman out of eighty-four entrants started. Her passengers were all women. She won third prize, a silver cup, given by the proprietress of the Wildwood Manor.

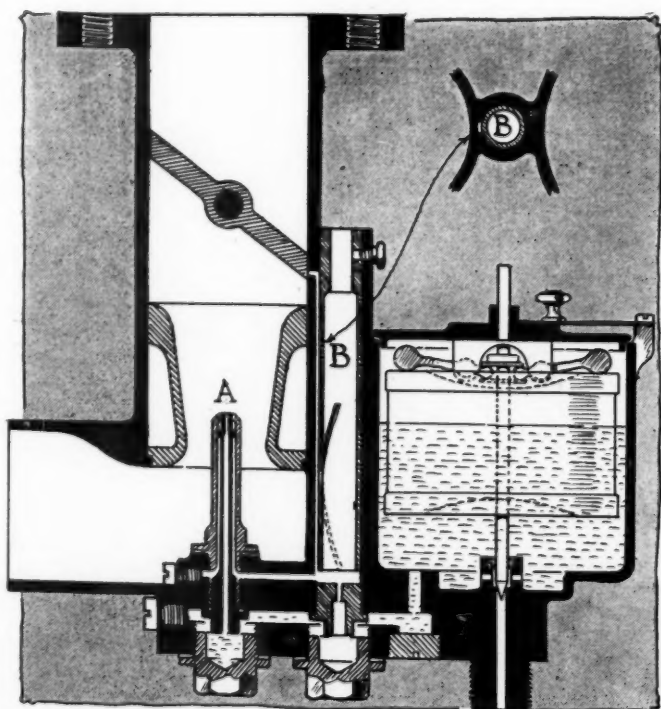


Fig. 4—Cross-section of Zenith carburetor, showing concentric jet

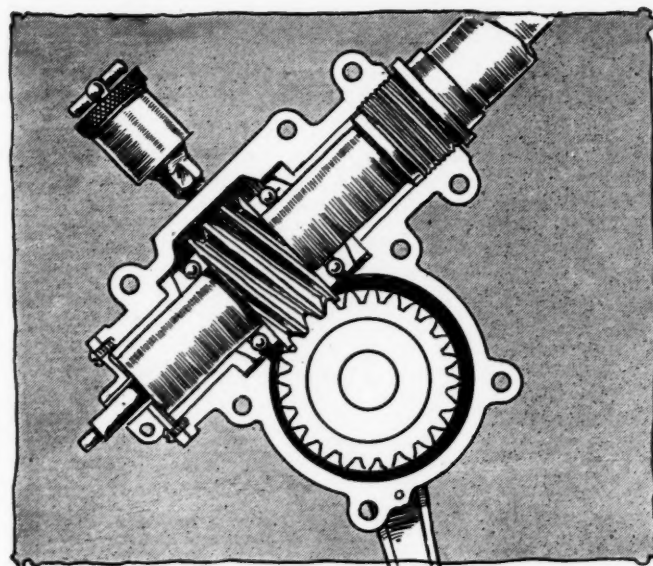


Fig. 5—Illustrating operation of worm-and-gear steering

I have been on all the runs in Philadelphia since the very first and have seen many different methods employed to mark the course, but after a trial on this run, plaster of Paris was found to be perfect, in that it does not blow away like confetti and children cannot pick it up. It will not disfigure the streets and it can be seen a block away, giving an entrant time to slow down for the turn.

Philadelphia, Pa.

MARY W. HARPER.

Operation of Zenith Carburetor

Editor THE AUTOMOBILE:—Would you kindly explain to me the action of the Zenith carburetor? I have a car fitted with one of these carburetors but do not quite understand its action, although it is very satisfactory and gives no trouble.

New York City.

J. G. RITZ.

—The Zenith carburetor is distinguished from all others by its double concentric jet which is shown at A, Fig. 4, and also by the tube B, a feature which is especially designed for the purpose of rendering starting easy. When the motor is stopped, a supply of gasoline rushes into the tube and remains there until the motor is again started. The level of the gasoline in the tube while the motor is idle will naturally be the same as that in the float chamber. When cranking the motor with the throttle very slightly opened the suction around the edge of the butterfly valve is strong enough to draw the gasoline in the tube through the opening at the edge of the butterfly, making starting very easy. This tube also comes into action at very low speeds, as the suction of the motor is not great enough to keep the gasoline exhausted and, as a result, there is a spray at the inlet near the butterfly valve which really takes on the importance of a third spray-nozzle. The amount of gasoline passing around the tube can be regulated by turning the tube on its axis. The auxiliary jet comes into action after the motor has speeded up sufficiently to suck the gasoline through the passage below the tube besides through the main jet. The faster the motor is running the lower will be the level of the gasoline in the tube B.

Letters Should Be Signed

[THE AUTOMOBILE is holding a few queries and communications which have been received unsigned. If a correspondent does not wish his name published it is merely necessary to state this fact in the letter and a nom de plume will be substituted. As an evidence of good faith, however, it is required that all communications be signed. Those which have been received up to date will be held until the identity of the sender is known. All communications will be answered strictly in the order in which they are received.—EDITOR.]

Great Western Adopts L-Head Motor

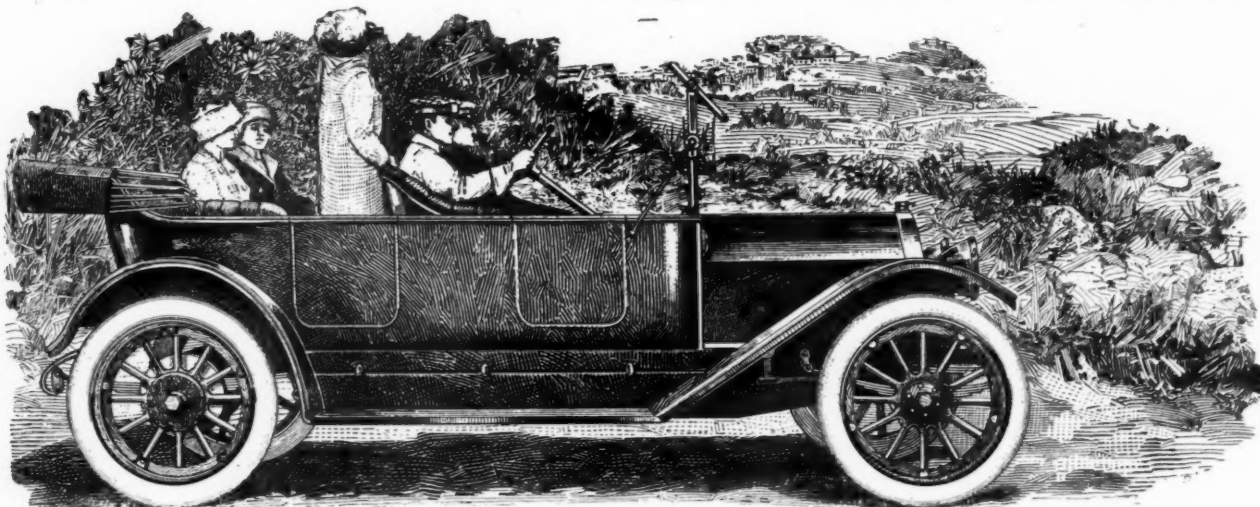


Fig. 1—Touring body fitted to the 1913 chassis brought out by the Great Western Company

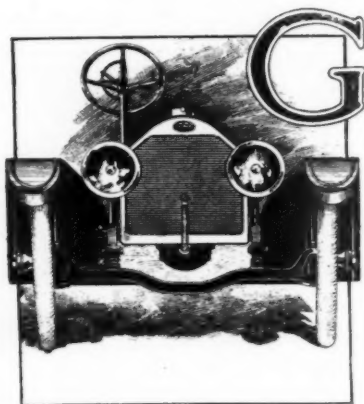


Fig. 2—Front view of Great Western

REAT WESTERN cars for the season of 1913 will consist of four body types, the chassis for all being identical. It will be known as the 40, the same name which has distinguished it during the past two seasons. One radical change marks the introduction of the new cars to the market for the coming year: the Great Western of next year will have an L-head motor. In previous years the inlet valves have been in the top of the cylinders

and the exhaust valves on the sides; they are now both on the right side of the motor. Another change in the motor is the lengthening of the stroke to 5 1-2 inches from 5 inches. The bore, however, remains unchanged, being 4 1-2 inches.

The change of stroke did not necessitate a change in design, but besides the advantage of covering the valves another advantage has been taken of the change in the operating mechanism; that is, to use roller valve followers, a step which will tend towards silence. The stems of the valves are of nickel steel, to keep wear

at a minimum; while the heads of the valves are of grey cylinder iron. The two parts of the valves are welded electrically.

The Great Western power plant is of unit type. Each of the four cylinders is cast separately. The pistons are of grey iron and have convex heads. Four eccentric rings are on each piston. With the separately cast cylinders plenty of room is left for five generously dimensioned crankshaft bearings, a feature which has characterized the Great Western product of former years. The main bearing surface totals up to 15 11-16 inches. The crankshaft is slightly offset and has its bearing provided with the die-cast babbitt. The camshaft is a solid drop forging. Accessibility of the crankshaft and camshaft bearings has been taken into account by placing hand-hole covers in the lower part of the crankcase just above the oil reservoir, which is located in the bottom of this casting.

The lubrication of the motor is by circulating constant-level splash. The oil reservoir in the crankcase has a 2-gallon capacity.

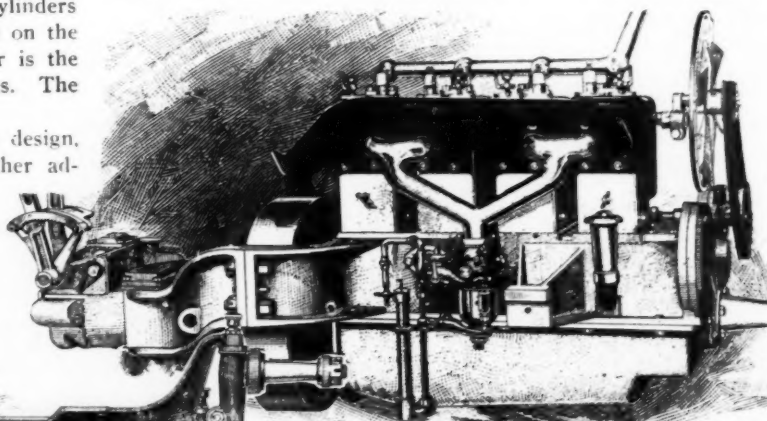


Fig. 3—Front and rear axles with steering connections

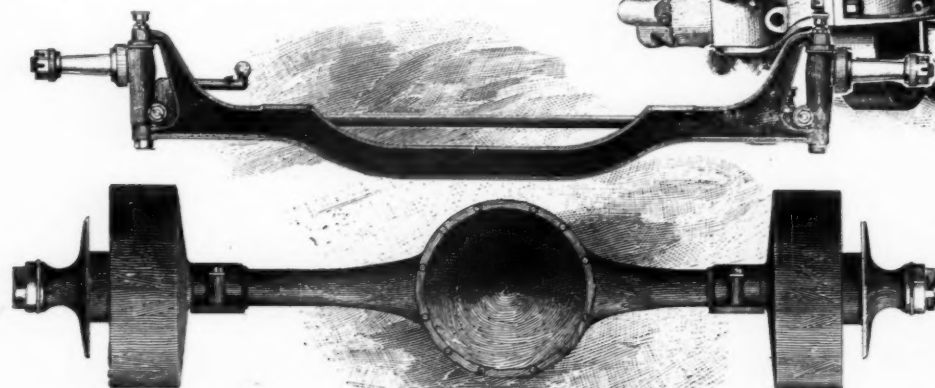


Fig. 4—Right or intake side of motor; note unit construction

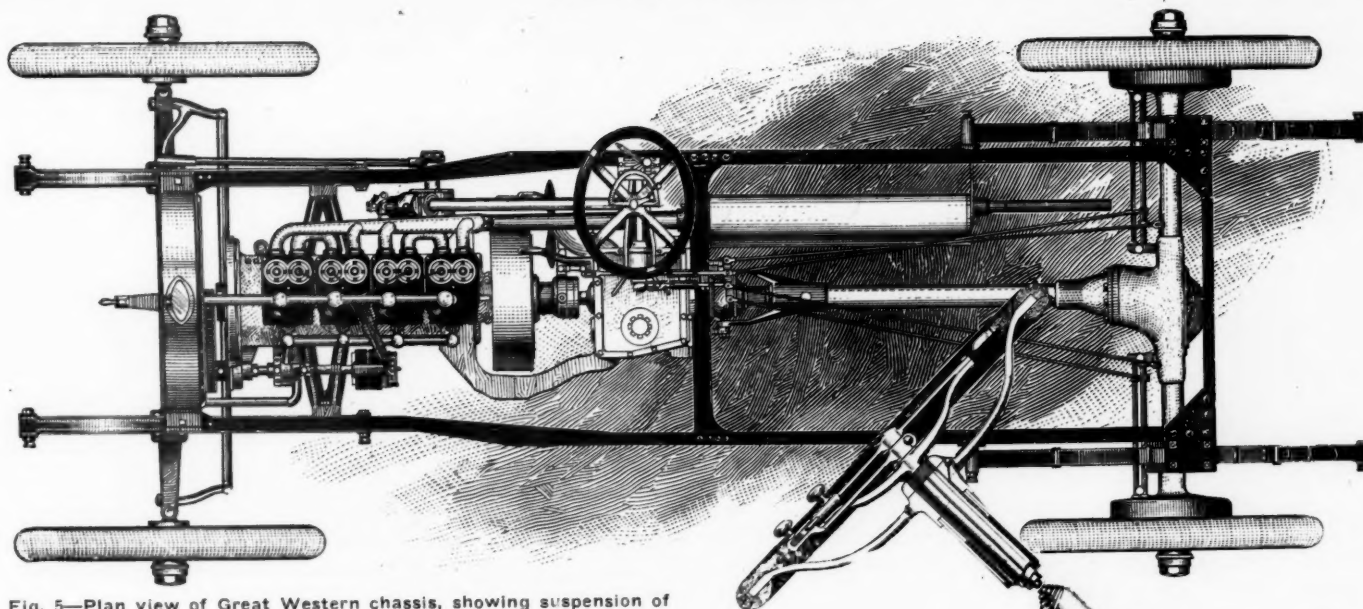


Fig. 5—Plan view of Great Western chassis, showing suspension of motor and drive

A plunger pump driven by one of the cams on the camshaft lifts the oil to the splash troughs in the upper part of the crankcase, where the lower ends of the connecting rods splash into it and throw the oil up into the cylinders. The oil pump is of such capacity that it refills the troughs faster than the oil is taken by the scoops, and as a result there is always an overflow which finds its way back into the lower part of the crankcase again. After passing through a screen it reaches the pump and is again circulated through the motor.

The cooling, carburetion and ignition systems are all the same as the 1912 model. The water is circulated by means of a centrifugal pump located on the same shaft as the magneto through aluminum pipes to the water jackets and thence to a honeycomb radiator which is hung on the frame by brackets which are not in contact with the radiating surface. A Schebler model L carburetor is employed, while the ignition apparatus is of the Remy dual type with concealed coil and dash kick switch with lock.

The clutch is of the cone type. A change since the 1912 model has been made here in that the angle of the cone has been decreased so that engagement will be more easy and the action will be more gentle. The cone is faced with copper-woven Raybestos and there are six flat springs beneath the facing for easy engagement.

A three-speed gearset is used which runs on a double row of

New Departure ball bearings. Ball universal joints are used in the propeller shaft, which is enclosed in a torque tube which connects the gearbox and the differential housing. A floating axle completes the rear system. Hyatt roller bearings are used in the differential and New Departure balls are in the axle. The springs are semi-elliptic front and three-quarter elliptic rear, 40 and 47 inches in length respectively. Double internal brakes are used on the 12-inch drums and equalizers are fitted on the brake rods. Instead of a 114-inch wheelbase, as for 1912, a 4-inch increase has been made. It is now 118 inches. As seen in Fig. 6, the steering gear is of the worm and gear type. Right control and drive has been retained.

The bodies are made of a combination of steel and wood and are upholstered in hand-buffed leather. The five-passenger tonneau is 45 inches wide. It has a small compartment between the two front seats for memoranda and the door hinges are concealed, giving a thoroughly up-to-date construction. The two-passenger roadster has a luggage compartment back of the seats and the four-passenger car has a removable tonneau.

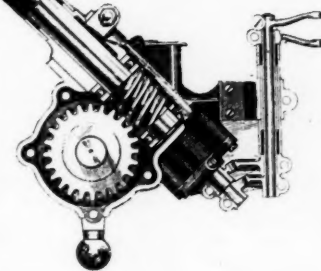


Fig. 6—Worm and gear steering mechanism

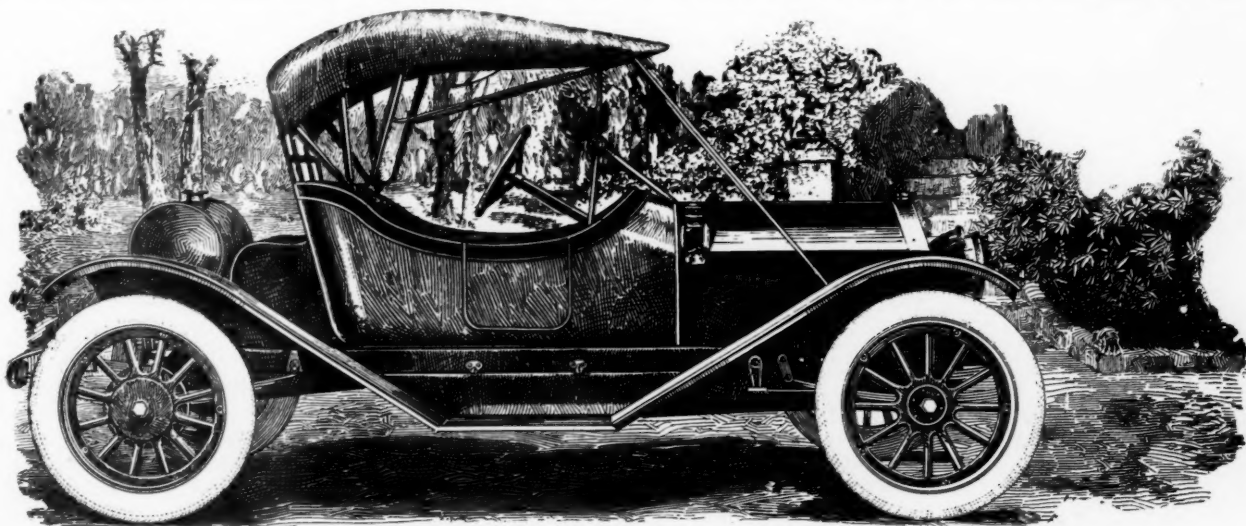


Fig. 7—Great Western Roadster fitted on the standard 1913 chassis

Four Stoddard-Dayton Models for 1913

THERE will be four Stoddard-Dayton models on the market for 1913. One of these will have a Knight motor; another, the valve-in-head plant which has distinguished the Stoddard line for 8 years, while the remaining two will embody motors of the en bloc type. The Knight motor is rated at 70 horsepower. It has six cylinders and will be placed in a chassis having left drive and center control, the same as was employed this year. The valve-in-head motor is rated by the manufacturers at 48 horsepower. All types of bodies are fitted to this model chassis, and right drive and control is used. The two en bloc motors are rated at 38 and 30 horsepower respectively. All standard types of body will be fitted to the 38, while the 30 equipment is limited to touring and compartment roadster bodies. Wire wheels are among the options for the six.

All the changes for next year are of a minor nature. Perhaps the most important change is the redesigning of the steering gear in the Knight car. This is now mounted on roller bearings and is of the worm and sector type W and S, Fig. 3. The shape of the front axle has also been changed, it now having but a single drop in place of the double drop of the 1912 cars. The cellular type of radiator has been retained, but in order to secure greater cooling efficiency it has been enlarged. The wheel hub bearings have also been made larger.

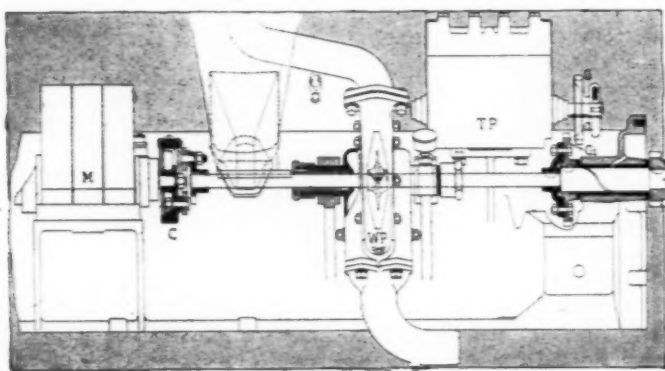


Fig. 1—Magneto and water pump shaft with tire pump on 1913 Stoddard

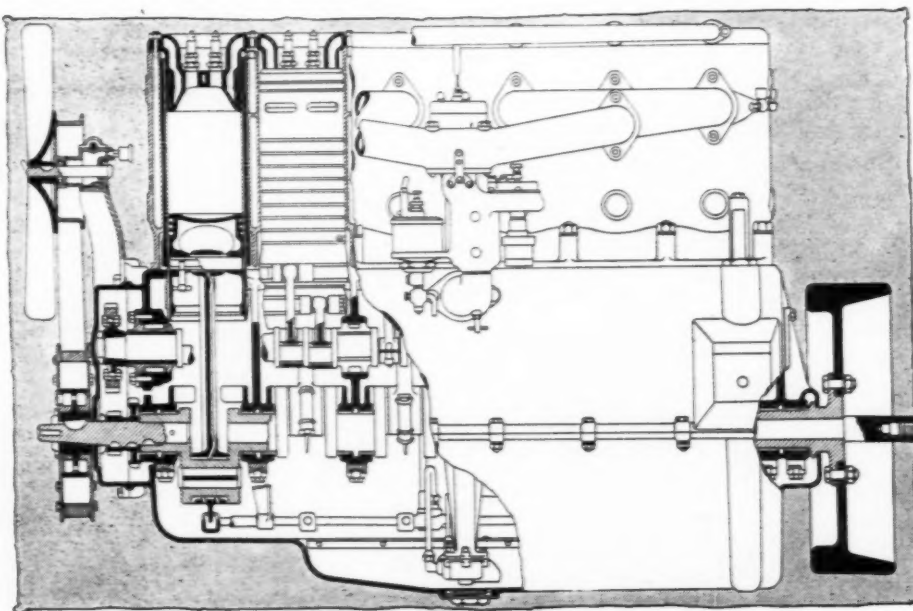


Fig. 2—Partial section of the six-cylinder Stoddard-Knight motor

Valve-in-the-Head Type Will Be Continued in One Model; Two Others of Block Motor Design

The changes in the 48, 38 and 30 are negligible, being very slight and consisting only of sliding front seats which permit of adjustment for any leg-length in the case of the 48. On all the poppet-valve models the bodies are mounted upon rubber blocks to prevent squeaking and to eliminate vibration to a large extent. In fact, all through the Stoddard line the 1913 cars are distinguished more by alternations in body shapes and in added body comfort than by mechanical changes. The bodies are all longer, and in the touring style of the Stoddard-Knight two extra tonneau seats are arranged so that they can be folded into the backs of the front seats and this be out of sight when they are not required. The body presents a straight-line appearance, and the side lamps are fitted in the center of dash ventilators.

The Stoddard-Knight motor has a bore of 4 1-2 inches and a stroke of 5 1-2 inches, giving a stroke-bore ratio of 1.22. The cylinders are cast in two groups of three, the casting being so arranged as to provide for a seven-bearing crankshaft. The motor throughout is of the conventional Knight type, the two sleeves being driven by eccentrics from a longitudinal shaft which is enclosed in the crankcase and driven by a silent chain.

Splash Lubrication Retained

Lubrication of the motor is by self-contained splash with movable troughs. All six troughs are hinged to a single shaft and by a system of linkage inter-connected to the throttle. When the throttle is opened the troughs are automatically raised about their respective hinges allowing the scoops on the bottoms of the connecting rods to plunge to a greater depth into the oil contained in the troughs and to throw more up into the cylinders and over the sleeves for this reason. The sleeve valves are grooved circularly on their outside surfaces for the purpose of distributing the oil thrown upon them by the splash, while to still further aid in this purpose the grooves are supplemented with small holes. An oil pump keeps the troughs constantly full and overflowing, the surplus oil draining back to the reservoir in the lower part of the crankcase whence it is again circulated through the system. In this system the aim has been to follow the practice of keeping the amount of oil supplied in exact proportion to the work done by the motor, this plan making for greater economy and efficiency.

While 916 feet per minute piston speed is reached at 1,000 revolutions per minute, the stroke of each sleeve valve is 1 1-8 inches and at 1,000 revolutions the linear speed of the sleeve is 93.7 feet per minute. The slow movement of the sleeves is relied upon to a great extent

Knight Sleeve-Valve Type Will Be Leader

Most Important Change is the Re-Designing of the Steering Gear—Wire Wheels Among Options

in aiding the lubrication by distributing the oil between the sleeves themselves and between the sleeves and cylinder wall.

The same ignition system which has been used on the Stoddard-Knight since its inception will be seen on the 1913 cars. It is a high-tension system acting simultaneously through two sets of spark-plugs and operated from one switch and coil on either magneto or battery. A starting vibrator is fitted to the coil which gives sparks all through the firing stroke but which does not fire the charge until the starting button has been pressed. On the magneto shaft is the tire pump, T P, and the water pump, W P, Fig. 1.

Other features of the car are the leather-faced aluminum clutch which has in addition to the leather facing a number of flat springs; the three-speed selective gearset composed of chrome nickel steel running in oil; single universal joint on the forward end of inclosed propeller shaft; bevel type of differential in floating rear axle, and two sets of 2 1-2 by 16-inch brakes. The spring suspension is semi-elliptic front and three-quarter elliptic rear; 2 1-2-inch leaves are used in the spring, giving a broad but shallow construction. The wheelbase is 133 inches and the tread the standard 56 inches.

Valve-in-Head Motor Continued

The equipment is a little more complete than ever before, consisting of best quality mohair top, top boot, storm curtains, windshield, seat covers, electric horn, trunk rack, speedometer, shock absorbers, demountable rims, aluminum running-board tool boxes, robe rail, foot rest, tire holders, tire irons, tire repair kit, a complete set of tools and extra demountable rim.

The 48-horsepower valve-in-head motor has been gradually developed by the Stoddard concern for the past 8 years, and the 1913 announcement shows no changes in the details of its construction. The bore of this motor is 4 3-4 inches and the stroke 5 inches. The four cylinders are cast in pairs, with the valve operation, as the name suggests, entirely in the head of the motor. The valves open inward into the combustion chamber and are actuated by rocker arms which reach across the tops of the cylinders. This motor has been installed in a chassis with a wheelbase of 122 1-2 inches. The two other motors are distinguished by having their four cylinders cast en bloc. They are of the L-head type and are rated at 38 and 30 horsepower respectively. The bore of the larger motor is 4 inches and the stroke 4 1-2 inches and of the 30, 3 3-4 inches and 5 1-8 inches. The wheelbase of the 38 chassis is 114 inches and that of the 30, 106 inches, the tread being standard at 56 inches.

The chassis details of these cars are practically identical. Leather-faced cone clutches with flat springs beneath the surface are used on all types. Ball bearing thrusts are used to destroy any harmful effects resulting from an end thrust on the crankshaft while the motor is running. The gearset on all these cars is of the three-speed selective type, the metal used in the construction of the gears and shafts being in all respects the same as that employed in the Knight car. A different feature, however, in this car is that drive and control are both right side.

A floating rear axle is used as in the Knight model, while the suspension is also the same with semi-elliptic front and three-quarter elliptic rear springs. The equipment is made as complete as can be desired for the 1913 cars, consisting of quick-detachable, demountable rims, mohair top and top boot, storm curtains, windshield, shock absorbers, tire irons, robe rail, foot rail, tool boxes, gas tank, gas headlights, oil side and tail lights and horn.

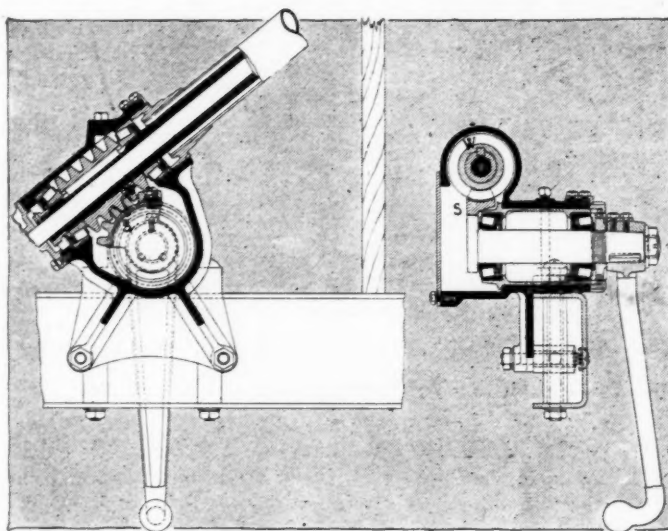


Fig. 3—Transverse and longitudinal sections through Stoddard steering gear

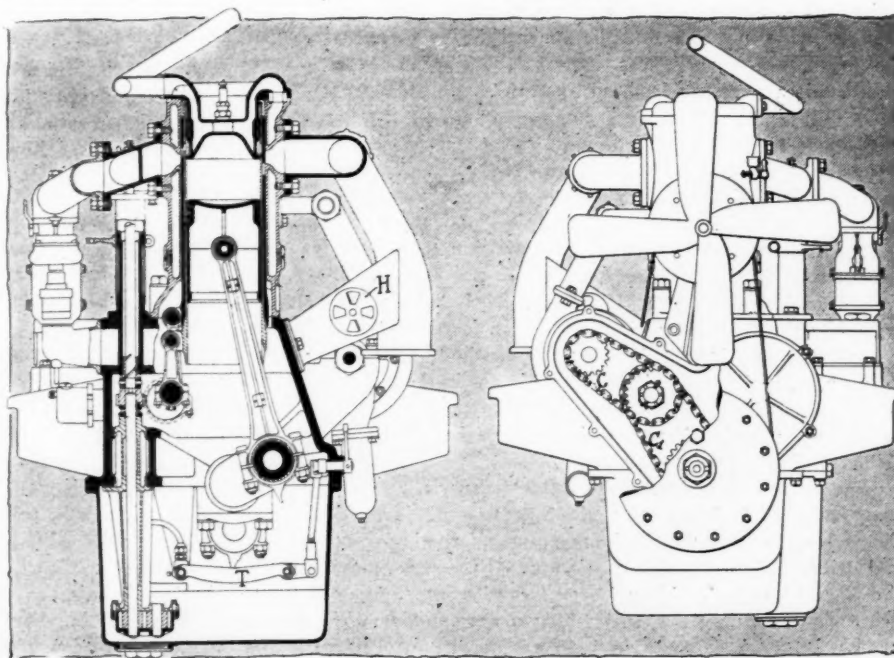


Fig. 4—Transverse section through Knight motor and view of chain drive to magneto shaft

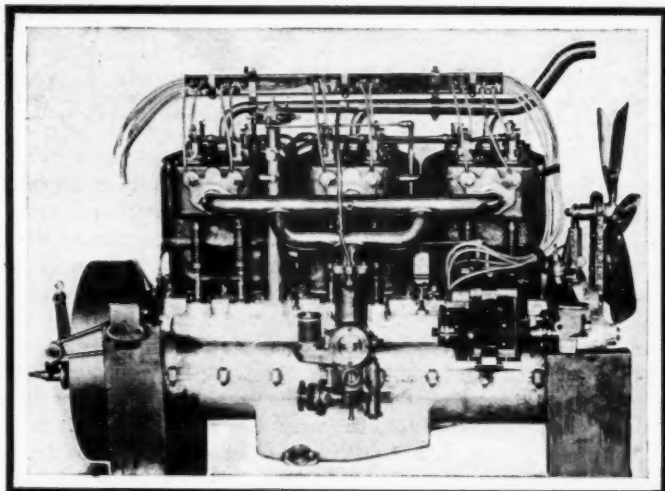


Fig. 1—Right side of Pierce motor, showing arrangement of carburetor and magneto

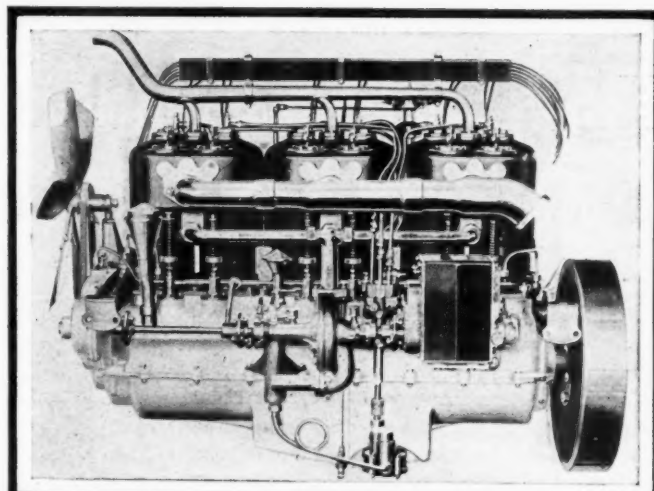


Fig. 2—Left side of motor, illustrating air pump and distributor valve of starter

1913 Pierce-Arrow

Company's Line Will Include Three Models, All of the Six-Cylinder Type—Mechanical Changes Numerous

Gravity Lubrication Succeeded by Force-Feed—New Double-Jet Carburetor on All Models

FOR next year the Pierce-Arrow line of three models will be continued, all being six-cylinder types much altered from the 1912 models. A careful analysis of these three models shows that more mechanical changes have been made for next season than have been made for several years past. The changes made are typical of the three models, so that there is a standardization of design of parts running through them all. These changes, while not affecting the general design or appearance of the parts, are nevertheless important. The motor has been fitted with a pressure-feed oil system to all of the crankshaft and connecting-rod bearings, thus doing away with the gravity tank above the cylinders; a two-jet carburetor has been fitted; a compressed-air starting system has been installed, supplemented by a gasoline priming equipment as used this year; a generator to furnish electric current for the lights and also to charge the storage battery has been fitted; a new four-cylinder air pump has been installed on the gearbox for air pressure on the starting system, and also for tire inflation; there is a new fan belt adjustment; the cone clutch is now leather-faced with cork inserts instead of with German bronze; the gearbox is located farther to the rear, and a splined mainshaft is used; the propeller shaft is a tubing of large diameter instead of a solid bar; the rear axle has been generally altered, making the drive shafts removable, using stuffing boxes to prevent oil leakage and fitting larger bearings; the Pierce-Arrow demountable rim is standard; bodies are generally 2 inches lower; wheelbases are 7.5 inches longer on the seven-passenger types, giving greater space between the dash and driver's seat, and also in the tonneau; sheet aluminum takes the place of cast aluminum in open car bodies, the cast product being continued in the closed types; a new muffler without cut-out has been fitted; there has been a general improvement in the accessibility of parts, some examples being the location of the

gearbox 4.5 inches farther to the rear to permit of clutch removal without interfering with the gearbox, mounting the tire pump on the forward end of the gearbox, fitting the double universal between the clutch and gearbox and making drain and test cocks on the motor oiling system more accessible.

The horsepower has been little changed except in what is known this year as model 36, but which has been changed to 38-C for next season. In this the cylinders have been increased from 4 by 5 1-8 inches to 4 by 5.5 inches, with larger valves and larger diameter crankshaft. The motors in the other two models remain unaltered, but their model numbers have been changed by the addition of a letter and now are 66-B, 48-B, and 38-C. In addition, the company is marketing a 48-D model, which is practically the 48 of this year with a Disco self-starter, the Adlake electric lighting system and the 1913 equipment added.

The motor sizes, horsepower, crankshaft speed, and piston displacement of the various models are as follows:

Model	Bore	Stroke	Horse power	Piston Dis.
66-A	5	7	66	825
48-B	4.5	5.5	48	525
48-D	4.5	5.5	48	525
38-C	4	5.5	38	339

While this table shows the factory horsepower ratings, the dynamometer tests show ratings much in advance of these. Model 66-A dynamometer test is 76 per cent. higher than S.A.E.; 48-B is 60 per cent. higher, and 38-C, 47 per cent. higher. The maximum crankshaft speed of 66-A is 1,700 revolutions per minute, and of the other models, all having the same stroke, it is 1,800 revolutions per minute. These speeds give piston speed in feet per minute as follows: 66-A, 1,966; 48-B and 38-C, 1,568 feet.

Changes Are Mostly Mechanical

Externally the 1913 motor bears a strong resemblance to that of this year barring the elimination of the gravity oil tank and the extra piping occasioned by the compressed air starter. Cylinders are made in twin castings with opposite valves and exposed tappets and valve springs. On the right side are the carburetor and magneto, the latter on the forward motor arm; on the left are four units: waterpump, oilpump, starter distributor and Westinghouse generator for lighting and battery charging. Leather disk couplings are used in the magneto, water pump and generator shafts. The disk on the magneto shaft is 4 inches in diameter and 1-4 inch thick and in the water pump shaft 3 inches in diameter and of the same thickness. The seven-bearing crankshaft is continued. The weight of connecting rods and other reciprocating parts is reduced, a connecting rod with its bushings in the 48-B weighing 4 pounds 4 ounces.

The most important change is in the lubricating system. This company was a pioneer in the non-splash circulating system, using as it did a crankcase gear pump to elevate the oil into a

large gravity tank above the cylinders. For next year this gravity system has been eliminated and now the oil pump feeds direct to the crankshaft bearings, to the lower connecting rod bearings and to the upper connecting rod bearings or wristpin bearings, as they are frequently designated. The oil pump OP, Fig. 3, delivers through a duct L to filter L1 and thence to a distributor pipe L2 lying along the top of the crankcase. This distributor delivers through a branch 1 to the timing gear, through a branch 2 to the front crankshaft bearing, through a branch 3 to the middle crankshaft bearing, through a branch 4 to the rear crankshaft bearing, and through a continuation 5 to the pressure gauge on the dash. The pump gives a pressure of 20 pounds to all parts. Each connecting rod is fitted with a small copper tube which leads the oil to the hollow wristpin. The crankshaft is liberally drilled so that branch No. 2 supplies the wristpins for cylinders 1 and 2 and also the bearing B2. Branch No. 3 supplies oil to bearings B3 and B4 as well as to the connecting rods for the middle cylinders. Branch No. 4 supplies for crankshaft bearings B6 and B7 and also for the connecting rods for the two rear cylinders. While there are three oil feeds, namely, branches 2, 3 and 4, to three of the crankshaft bearings, it has been demonstrated that one branch is sufficient to furnish oil for all of the crankshaft bearings and the six connecting-rod bearings, this being due to the continuous oilway from end to end of the crankshaft and the pressure of 20 pounds generated by the pump. A double precaution has been taken in the matter of screening the oil between successive circuits of the motor. There are two strainers, S1 surrounding the suction pipe through which the pump draws its supply and SL in the discharge pipe. Both can be readily cleaned, that on the suction side of the pump by removing a plug in the face of the crankcase and the strainer SL by the hinged cap of the chamber L1 in which it is located. Heretofore the Pierce company has used baffle plates in the open ends of the cylinders to prevent an excess of oil being splashed, which might result in carbon deposits; but for 1913 these baffles

will not be used, the reason being that with a new pressure oiling system delivering oil up the connecting rods there will not be that amount of oil thrown off the crankpins, and so an excess will not reach the cylinders.

Two commendable improvements in the field of accessibility are noticed in the carrying of the shaft for the drain cock up to the top of the crankcase at H1 and also that for the oil level test cock up to the point H2, making it possible to open each of these without having to reach down among the motor parts. The oil pump is external and is removable by means of the jaw coupling J. Its shaft carries on its upper end the air distributor.

Double-Jet Carbureter Adopted

A new carbureter is used on all models. It is a double-jet type, the first time one of this type has been used by the company. The entire mixing chamber is water-jacketed and the water jacketing extends twice as high as formerly. The two nozzles N and N1, Fig. 4, are located respectively in the center of the concentric float and in the auxiliary air passage. Both are

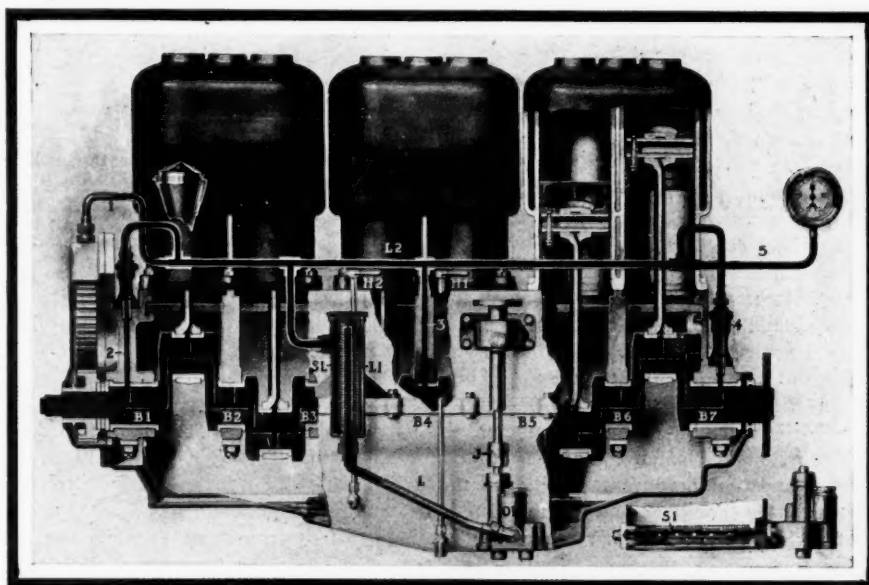


Fig. 5—Force-feed oiling system of Pierce motor, showing bored crankshaft and other oil leads

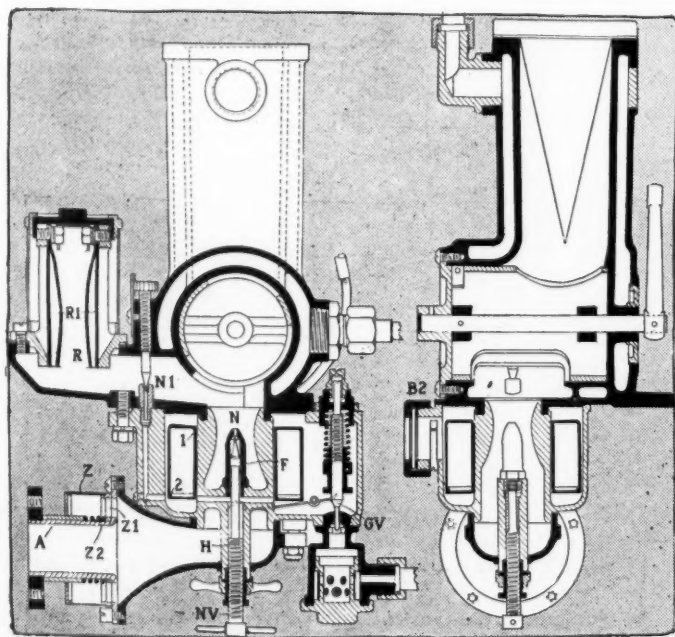


Fig. 6—Double concentric jet carbureter used on Pierce motors

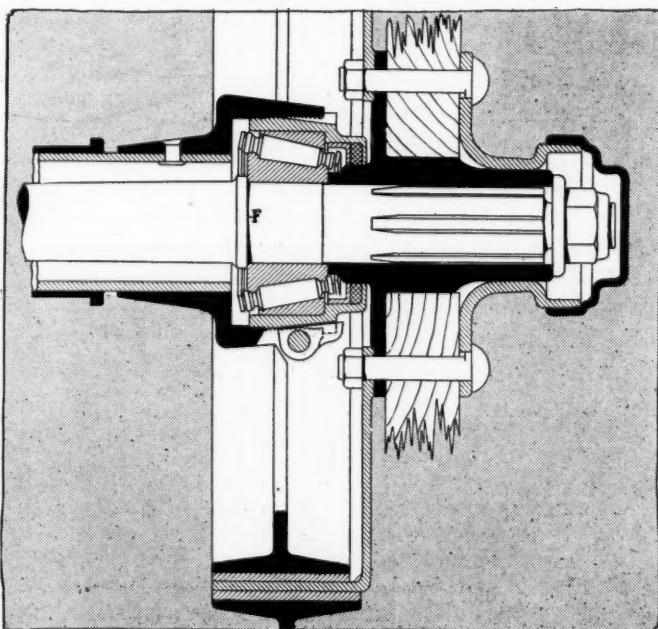


Fig. 7—Section of Pierce rear wheel, showing roller-carried hub

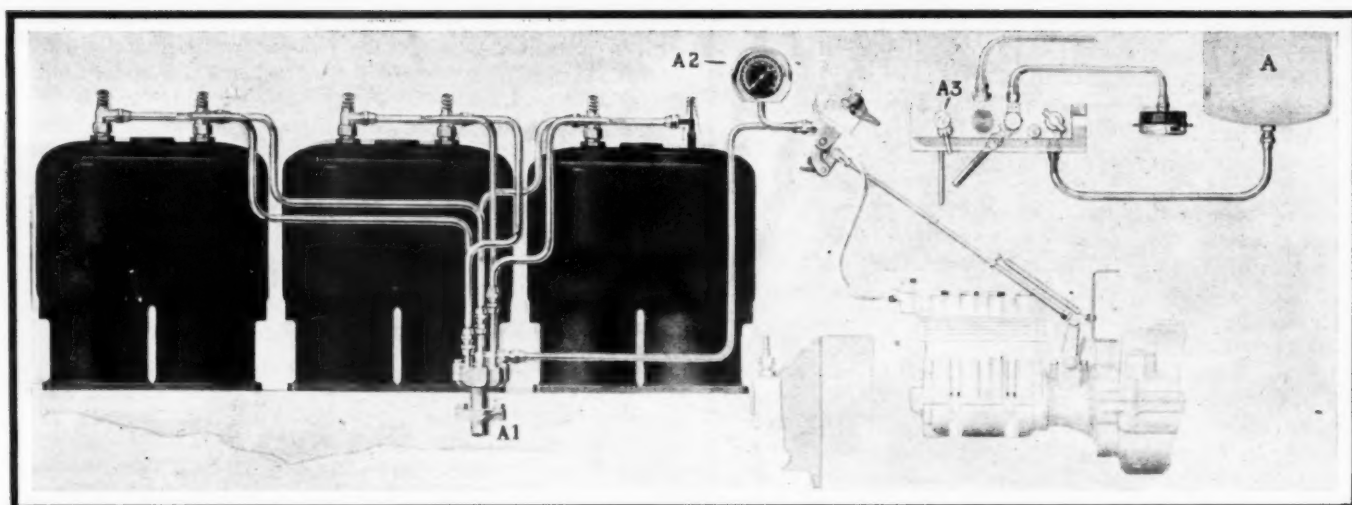


Fig. 3—Schematic view of self-starter and location of pump, air tank and distributor

controlled by hand-adjusted needle valves and are so positioned that the auxiliary nozzle does not come into use until a speed of 800 revolutions per minute is obtained and the auxiliary air valve has opened. Using the two nozzles gives a better carburetor performance on low-speed work and also on high-speed work, than was obtainable with the single-jet used to date. Thus there is a high general average on low, medium and high speeds due to the double-jet combination.

An admirable improvement has been made in the needle valve in the main nozzle. This valve has a 19-degree taper on its upper end and to protect this taper there is an enlarged fluted portion F serving as a guide to insure the point of the needle centering in the opening of the nozzle. There is a second protection for the coned tip by way of a shoulder H on the valve. The valve is a double-threaded diameter, the portion above the shoulder of small diameter, that beneath the shoulder of larger diameter, and the shoulder so positioned that when the valve is set tight on the shoulder the tip of the cone is in its proper closest adjustment. This protection removes the possibility of destroying the cone tip by screwing it up against the opening in the nozzle.

The auxiliary nozzle is a similar cone-tipped, hand-adjusted needle valve. The operation of this nozzle is closely connected with the auxiliary air valve, which has not been changed. This valve consists of two sets of reeds or vertical leaf-shaped springs. The outer set R₁ is the weaker and opens partially. For further opening the reeds bear against the inner set R, which are stiffer, thereby giving a progressive opening to the auxiliary air supply. A still further progression is obtained in that one of the reeds R₁ is weaker than the other, thereby opening slightly in advance. This is also true of the two reeds R.

Not Affected by Weather Changes

The main air system can be regulated for hot and cold weather. To the pipe A a tube from the muffler pipe connects. Surrounding this is an annular space formed by a housing Z, the inner end of which has a series of circular openings Z₁. There is a corresponding circle of openings in the carburetor horn at this point so that by seizing the housing Z by hand and pulling outward against the tension of the spring Z₂ the two sets of holes can be locked in different degrees of register and thus regulate a supply of cool air which enters through openings in the housing. In hot weather the holes Z₁ are in complete register, admitting the maximum of cool air; in cold weather the holes are out of register and the entire air supply taken from the hot air pipe through the opening A. The air supply through the auxiliary valve is always cold.

The gasoline system in the carburetor remains much as heretofore, but the controlling valve has been re-designed. It has a beveled seat GV with a vertical small-diameter guide projecting

downward from it. This seat rests in a corresponding bevel in the casting. Both valve and seat are ground with pumice stone. The valve is of meteor metal, which is largely nickel, much harder than brass, thus being proof against cutting or wearing. To show the gasoline level a bull's eye BZ is placed in the side of the float chamber and in it is a vertical gauge rod on which the proper level of gasoline is indicated. The float is a hollow brass piece soldered at diagonal corners 1 and 2.

Self-Starter on All Models

The company is using for the first time a compressed air-self-starter on all three models, the air pressure coming from the four-cylinder air pump located on the forward end of the countershaft of the gearset and so arranged as to be thrown into operation by pedal at the driver's will. The air from this pump is delivered into the air reservoir A, Fig. 6, where it is held at a pressure of 200 pounds. From this tank it is led to the air distributor A₁ located on the left side of the motor between the water pump and lighting dynamo and driven by a continuation of the vertical oil pump shaft. From the air distributing housing piping leads to special connections in the cylinder heads, each of these containing a check valve. The control of the apparatus is from the floor board, where there is also located a gauge A₂ to show the air pressure in the tank. A₃ shows the control for cutting the air pump in or out of service, and to its left are the other control parts, this illustration being a top view of the control parts. The air distributor is a rotating disk having an oblong circumferential slot. The air supply enters the cover of the distributor centrally and the air delivery pipes enter the distributor case beneath the disk. As the disk rotates its slot

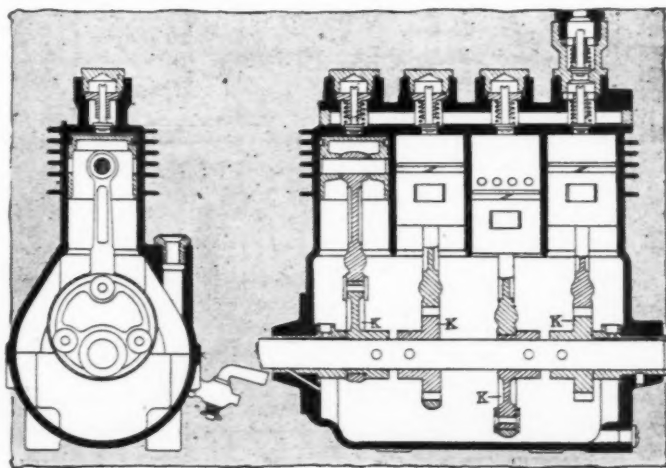


Fig. 4—Cross and longitudinal section of Pierce motor

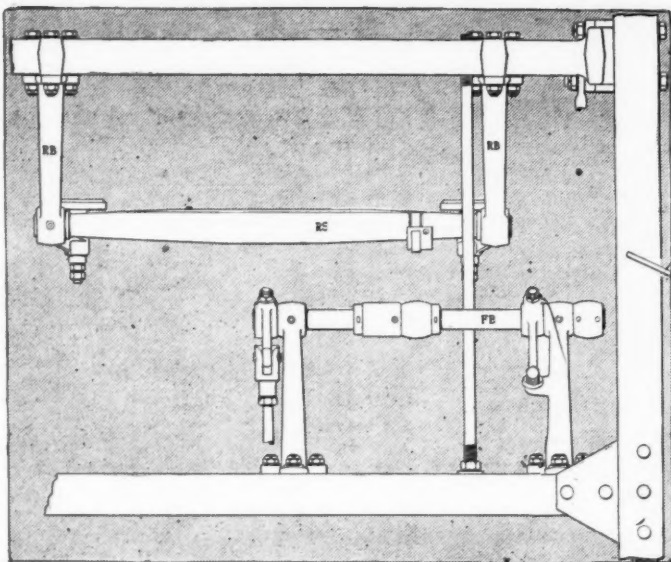


Fig. 8—Method of supporting the clutch rocker shaft on the frame

registers in firing order with the different cylinders delivering the air pressure to the one on suction stroke and to the others in sequence, so as to give a continuous turning movement to the crankshaft.

Tires Are Inflated by Power

A new design of power air pump is used for tire inflation and also to furnish the 200 pounds air pressure needed for the self-starting reservoir. The pump is a Pierce product and is a four-cylinder air-cooled design located at the forward end of the countershaft of the gearset and controlled by clutch mechanism with operating parts on the dash so that the pump only operates when the driver wants it to. The cylinders, of 1 7-16-inch bore and 1 1-4-inch stroke, are formed in one casting which is integral with the upper half of the crankcase. The crankshaft is a 5-8-inch bar on which are mounted the four eccentrics K, Fig. 7, which take the connecting rods. The pistons carry one eccentric ring with diagonal split at the upper end and have large rectangular perforations midway of their height. In each cylinder head is an automatic discharge valve forming a connection between the pump cylinders and the collector tube in the casting

head. There is a fifth automatic valve in the delivery tube to the tank reservoir, this valve being located immediately above the valve for the front cylinder.

The pump operates on the two-cycle principle, there being drilled in the cylinder walls a series of small holes at a point immediately above the piston head at the lowest point in its stroke, these holes appearing in the second cylinder in the illustration. The pump has an overall length of 10 inches and a height of 8 inches.

For tire inflation work it is recommended to take the air direct from the pump instead of from the 200-pound reservoir located on the chassis over the muffler, this being due to the possible danger of bursting tires by using the reservoir pressure. Inflating direct from the pump can be done in a 38 by 5 1-2-inch tire in 7 minutes.

Details of Clutch and Gearset

In manufacturing the pump every care has been exercised in the finish of the cylinders, pistons and rings. It operates at one-half crankshaft speed.

Fig. 9 shows the clutching mechanism at the forward end of the gearshaft. The housing G extends and to this bolts the corresponding housing on the pump. The forward end of the countershaft has a jaw clutch G1 with which is engaged a corresponding sliding clutch G2 on the pump shaft.

The four-speed gearbox, which has been a standard of Pierce construction for several years, is continued in improved form. The main shaft MS, Fig. 9, is a fluted design, having six flutes. The rear end of this shaft, where it takes the universal joint member, is also similarly fluted. Both ends of the shaft are provided with self-adjusting glands to prevent oil leakage. These consist of a packing G compressed by a small plunger backed up by spring G1. The entire stuffing box construction is contained within a cap K holding the bearing in place. Similar stuffing boxes are not used on the countershaft for the reason that there is a bearing cap K1 at the rear end which does not offer any chance for oil escaping and at the forward end of this shaft the housing G containing the air pump clutch forms an oilproof connection with the air pump housing.

A new form of interlocking device is used to prevent the engaging of two trains of gears at the same time. This is an automatic arrangement consisting of a small vertical roller R located between the two shifter rods R1 and R2. A slight groove is cut in the adjacent side of the shifter bars at this point, and the width of the roller is such that when resting in one groove the

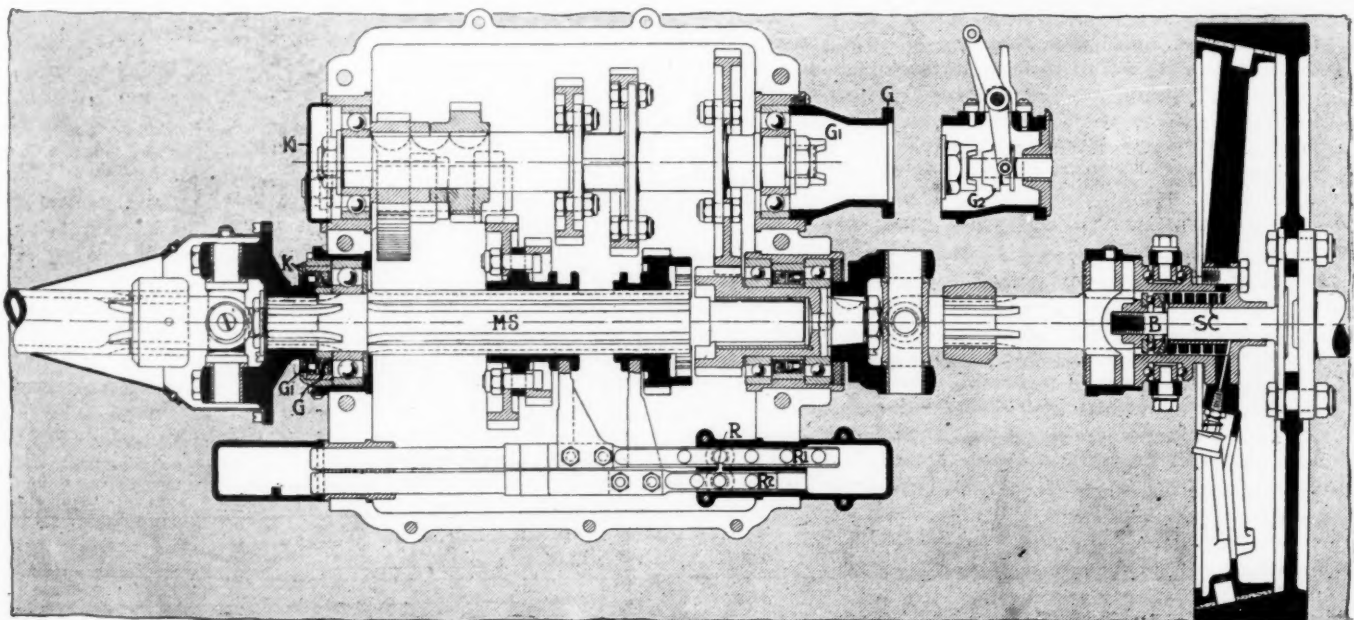


Fig. 9—Sectional view of the four-speed gearset and cone clutch. Attention is called to the arrangement which prevents simultaneous meshing of different gear trains

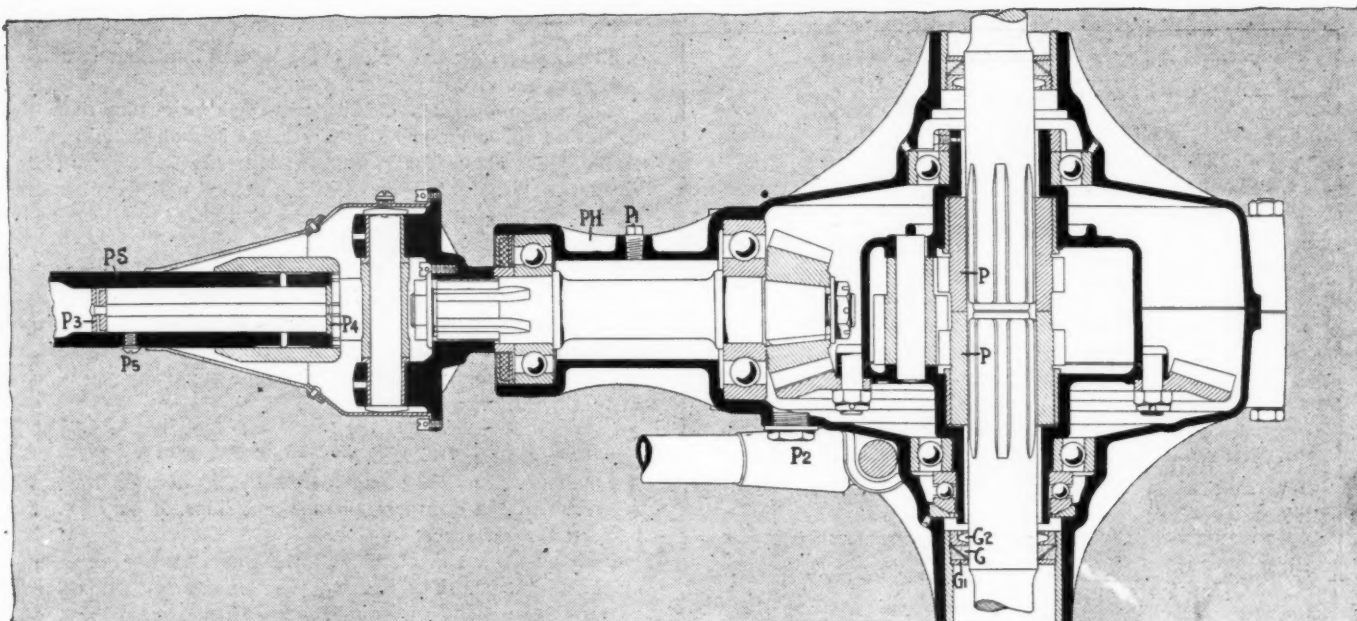


Fig. 10—Horizontal cross-section through end of propeller shaft and differential gearset

other shifter bar is free to move, but there is not sufficient room for the roller should both bars be removed at the same time. With this simple protective measure the old form of interlocking bolt and quadrant type used to insure the clutching being disengaged before gears could be shifted has been eliminated. There was a time when the company considered such protection necessary, but that time is now past.

An important clutch change has been made, in the form of using a leather facing on the cone with cork inserts. Heretofore a German bronze composition has been used. In clutch engineering the aim is to reduce weight to the minimum in the cone itself. This is done to prevent grating and grinding when shifting gears. The leather with cork inserts is lighter than the bronze facing. The clutch is a 13-degree cone angle. The engaging spring SC, Fig. 9, is entirely enclosed and its end thrust is taken by a self-centering thrust bearing B, the self-centering factor being the arc of curvature on the inner thrust plate. There is 4 1-2 inches more space between the clutch and gearbox than this year, making it possible to remove the clutch without interfering with the gearbox. This additional space permits of the use of a double universal joint at this point.

Still another clutch improvement, which is closely associated with the control parts of the car, consists in mounting the clutch rocker shaft RS, Fig. 8, on two brackets RB attached to the rear cross support of the motor, this support being an I-beam forging. This year this rocker shaft is supported on the side members of the frame, but in its new position its easy operation is insured in that should the side members of the frame warp, due to road irregularities, there is no danger of it interfering with the easy operation of the clutch. Hand in hand with this is the mounting of the foot brake shaft FB on similar brackets supported on the cross member of the frame instead of mounting it on the side members. The same object has been in view, namely, the preventing of frame strains interfering with brake operation.

Accessibility of the Rear Axle

On all models the rear axle driveshafts X, Fig. 14, may be withdrawn without dismantling the housing. Heretofore on all models excepting the 66 the differential pinions P have been keyed to the shaft, making withdrawal impossible. The new construction is a floating design, but the removal of the driveshaft calls for the removal of the road wheel together with the Timken bearing supporting the outer end of the axle. Fig. 5, shows the flange F against which the bearing rests and by means of which the end thrust is absorbed. Axle driveshafts are

1-8 inch larger in diameter and they are fluted at the inner and outer ends instead of being keyed at the inner ends and provided with taper and key at the outer end. On Model 66-A ten splines are used on either end of the shaft, whereas models 38 and 48 use six splines.

For 1913 all models will use a heavy black liquid oil for the bevel gears instead of axle grease. This has called for the introduction of packing glands at either side of the differential to prevent oil working out and getting on the brakedrums and wheels. There is a gland at each side consisting of No. 109 Crandell diagonal packing G held between a steel washer G1 resting against a shoulder in the axle sleeve, and a threaded nut G2 at the inner side. As the nut is threaded against the packing the diagonal split allows the halves to gradually slide up against each other forming a tighter joint. The use of liquid as lubricant is due to the fact claimed that with axle grease under continuous running at high speeds the grease is thrown off the pinions by centrifugal force and has not time to come back to them.

Tubular Propeller Shaft Used

The axle housing remains practically as heretofore and consists of bell-shaped halves to take the differential, these being steel castings, into which Shelby steel tubing, which forms the axle sleeves, is brazed and riveted in place. A new and longer pinion housing PH is used and is fitted with two Hess-Bright bearings to support the shaft. These bearings are now farther apart, and the rear one, a No. 409, is larger than in previous years, this being done to hold the bevel pinion better up to its work. Axle grease is used in this housing, being inserted through the plugs P1, while P2 serves for inserting the liquid lubricant for the differential bevel.

This illustration shows how the forward end of the pinion shaft has a six-spline ending to take the universal joint. It further shows the use of the tubular propeller shaft PS, which is new on all models. The tubular construction has been used because of lighter weight and greater strength, there being a reduction of 15 per cent. in the weight when compared with solid

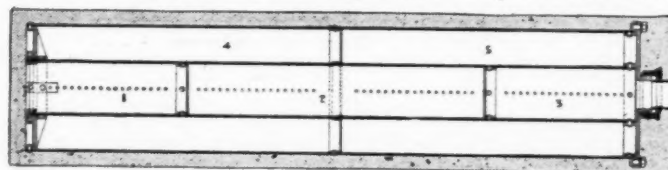


Fig. 11—Double concentric tube muffler giving silence and minimum of back pressure

shafts with increased strength. The added strength is due to the larger diameter which prevents whipping of the shaft and thereby eliminates chattering in the universal joints as well as in the gearbox. On Model 66-A the tubing is 2 1-8 inches in diameter and of 5-16 stock.

A neat method of lubricating is employed for the rear end of the shaft where it takes the sliding joint. The shaft carries six flutes or splines and within it is a packing piston, the forward end P3 being made up of a leather disk between two metal washers, while the rear end is a metal plate P4 fitted against a shoulder on the end of the shaft. Through a plug P5 the chamber between these ends is filled with lubricant which works out through the drilled holes in the shaft. In this particular the hollow propeller shaft is of special merit as it facilitates and insures adequate lubrication of the slip joint.

The Pierce engineers have recently installed a special testing machine to discover amount of backlash in the differential planetary gears. The axle is mounted in its housings and the large spur gear locks. An 18-inch crank is attached to the outer end of one driveshaft. An indicating pressure gauge is adjusted so as just to bear upon this crank. The tester seizes the end of the crank and moving to and fro discovers through the reading of the pressure the exact amount of backlash. In order to guard against backlash the six spur pinions of the gearset are carefully selected with reference to one another, and are retained in sets. If, however, when the final test is made there is too much backlash an entire new selection is made. The reason for special care in the elimination of backlash is that according to the Pierce engineers it is largely responsible for noises which are transmitted to the gearbox, and it also increases tire wear.

Muffler Reduces Back Pressure

The new muffler, Fig. 11, consists of two concentric tubes, the inner tube, 2 3-4 inches in diameter, divided longitudinally into three sections 1, 2 and 3, and the outer one, 6 1-2 inches in diameter, into two sections 4 and 5. Gases enter No. 1 division and escape through openings and expand into No. 4 division. They progress from No. 4 into No. 2, which is double the length of No. 1, and again expand into No. 5 and finally escape through No. 3 to the muffler tail pipe. Back pressure on the motor has thus been reduced to a minimum, as demonstrated by the slight differences when a cutout is used and when not used, the factory conclusion being to discontinue the cutout.

The Westinghouse generator mounted on the left rear side of the motor and driven through a continuation of the waterpump shaft runs at crankshaft speed and will generate sufficient current at 12 miles per hour to supply the lights. The generator weighs 38 pounds and is so compact as not to interfere with valve spring accessibility for the front cylinder casting. The genera-

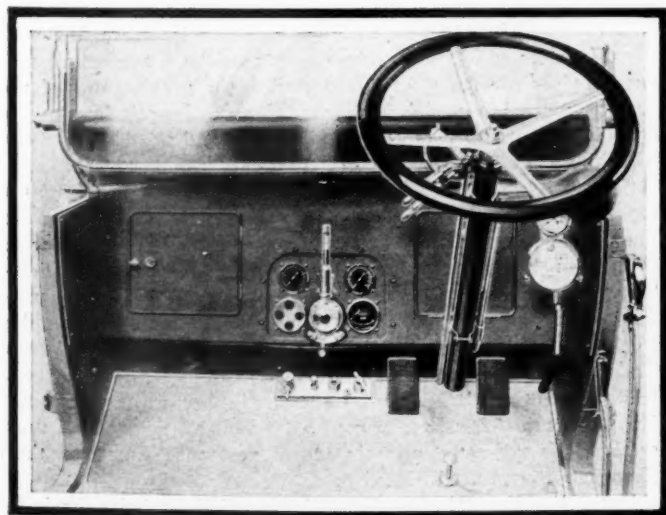


Fig. 12—The appearance of the Pierce 1913 dashboard is simple

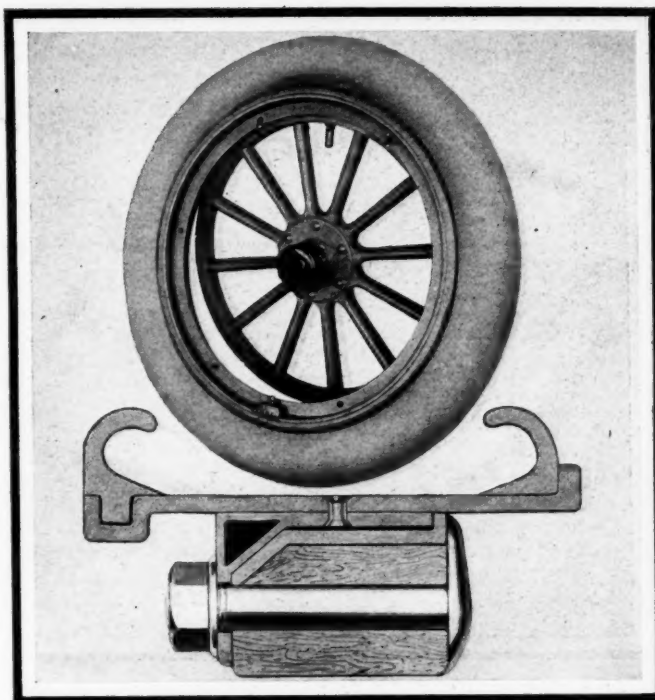


Fig. 13—Rim of Pierce-Arrow cars takes demountable or quick-detachable tires

tor discharges into an 80-ampere-hour Exide battery and supplies a lamp equipment made up of 20-candlepower headlights, 4-candlepower dash lamps, one 4-candlepower tail lamp, a 4-candlepower license lamp and a 1-candlepower gauge light on the dash. All lights take a 6-volt current. The generator is fitted with a magnetic clutch which prevents the battery discharging through the generator when idle. On open cars the amperage consumption for the entire lamp equipment is 10.5 amperes and on the enclosed and suburban types, which have dome and side-door lights, the consumption is 11.75 amperes. The wiring is all in copper tubes and the single-wire system is used, that is, the wire leads to the lamp filament and the other end of the filament is grounded. This wiring system for lights is simpler than the double-wire one and permits of a stouter bulb construction. A feature of the generator is that the current is sent through an iron resistance which regulates the voltages and thereby protects the bulbs. On the dash is a voltmeter connected across the battery. The battery in addition to furnishing light is also used for ignition in starting and in emergencies.

The 1913 braking system is the same as at present, consisting of internal and external sets on the rear hubs. The expanding set is faced with German bronze and the contracting set with asbestos fabric. The bronze has been used by the company for several seasons and gives 15,000 miles service without adjustment. The fabric for emergencies is used so as to have two different brake surfaces; should the metal be affected by heat, the fabric remains in working condition. Drum sizes are the same as before.

Pierce Company Has Own Rim

The company fits its own demountable rims, which will take any type of quick-detachable tires. The wood felloe is bevelled to approximately 45 degrees at one side, this bevel extending one-third distance across the felloe top. Over this is fitted a metal band which receives a corresponding band electrically welded to the inner side of the rim taking the tire. A series of six transverse bolts draws the rim's beveled surface up on the band bevel so that the transverse bolts are not called upon to carry any of the radial load. There is a radial projection on the rim bevel which is brought up tight against the outer side of the wood felloe and at the same time the rim is brought up against a shoulder on the felloe band at the inner side of the felloe. The transverse bolts are made with large, strong heads.



An encampment of motor trucks in the Tripoli war district—These trucks have all been requisitioned from their owners in Italy

Motor Trucks in Tripoli

Fleets of Home-Built Vehicles Enable Italians to Wage Effective War in Enemy's Country

**Specially Equipped to Carry Water, Provisions, Baggage,
Ammunition and Other Necessities**

NEVER has a modern war been conducted with so little publicity as that which Italy wages against the Turks in Tripoli and Cyrenaica, those once fertile and prosperous provinces along the African coast of the Mediterranean Sea where the suzerainty of the Sultan of Turkey over the native Arabs for many years has been maintained only in name and by the religious bonds which unite all of Islam. Japan's example in successfully excluding the war correspondents from all early and real knowledge of the war movements in its recent war with Russia has, it is supposed, had much to do with the policy of silence which Italy has adopted, but still more powerful in this respect has been the desire of the Italian army and navy departments to keep all which might be learned with regard to the use of automobiles and aeronautic war equipment for themselves. From such sporadic accounts as have leaked out, it appears, however, that the passenger automobile has not so far proved itself of great utility, the war being one of slow penetration and occupation in which the rapid movement of troops has counted for so much less as the roads were mostly non-existent when the war began over a year ago and could be built and pushed forward only in the measure as the occupation proceeded and was safeguarded against the guerrilla attacks of the intrepid Arabian tribes. In the reconnoitring service aeroplanes were hit and brought down with rifle bullets whenever the pilots ventured near enough to the ground to make an intelligent croquis of the situation, but the dirigible balloons, on the other hand, being not forced to maintain themselves in the air by high speed and being able to carry a larger number of competent observers, are reported in several instances to have brought home valuable tactical information gleaned from an altitude of 6,000 feet above the territory which it was the intention to occupy next.

The transportation of materials wherewith to fortify and secure every advance gained by the infantry has in this slow conquest played an important part, and for this reason the motor truck has been much more conspicuous than the automobile of the passenger-carrying type. But the motor truck has no more been in the foreground of events than its lighter and faster kin. Its mission has been to carry the supplies from one camp already established and secured to another next in order to be prepared as a permanent fort in this campaign of forcible colonization, by which Italy hopes to keep her sons under her own jurisdiction and stem the flood of emigration to the United States. The accompanying illustration shows a division of these motor trucks, all of Italian manufacture, parked in safety and ready for their next errand of peaceful carrying of useful loads.

Foreign Markets for Motor Vehicles

Washington, D. C., Aug. 3—The fact that the motor car makers of the United States are annually making enormous strides in their invasion of the foreign markets is brought out forcibly in a monograph entitled "Foreign Markets for Motor Vehicles," just issued by the federal bureau of manufactures. This publication is a compilation of reports from American consuls stationed in every part of the globe, and is arranged with the particular end in view of aiding American manufacturers to extend their foreign sales. It describes the peculiarities of the various markets, special local conditions and prejudices to be considered, foreign competition to be met and the best methods of selling cars.

Canada is the United States' best market, the majority of the cars in use in the territory of our northern neighbor being either made entirely in the United States or made by Canadian branches or affiliations of American firms. The high-road clearance, flexibility and moderate price of the American car are steadily winning it favor in regions where highway conditions are similar to those in the United States. The market in Australia and New Zealand is already being well cultivated by American exporters, while Argentina, Brazil and Uruguay in South America, and British South Africa are named as promising fields for future sales. It is estimated also that there are more American than European cars in use in Mexico.

In the Far East, Ceylon, India, Japan, Siam, and the Straights Settlements are the most likely markets. China has little use for motor cars, as most of the roads of that country do not permit

their use. The reputation of American-made cars in India suffered some years ago because some inferior cars were sent among the earlier shipments to that country, but the cars brought from the United States recently have been of such high grade as to dispel this prejudice. In the Straights Settlements the principal buyers are wealthy Chinese, who demand comfort and luxury in their cars rather than high power. As a result, low-hung, smooth running cars are the most popular, and the local trade often demands that each car be fitted in accordance with the individual taste of the owner. Right-hand drive is essential there, as in the Orient all traffic turns to the left, instead of to the right, as in the United States.

The United Kingdom has been and continues to be an excellent market for American cars, ranking next to Canada in purchases from the United States, but the sales in continental Europe have thus far not been extensive. The excellent roads of most of the European countries permit the use of a heavier, lower-hung car than is found commonly in the United States. In England, however, the low prices and complete equipment of American cars are fast increasing their popularity, while they are rapidly overcoming the prejudice against them, caused by doubt as to their durability due to the sale of many cheap, unsubstantial American-made bicycles in England some years ago. The method of American makers in putting their cars on the market fully equipped is in strong contrast with the practice of continental makers, who quote prices on the chassis only, with the body and all equipment listed as extras.

New York's Fire Rules Revised

The first revision of the rules of the New York Fire Department has been made since 1905 and a neat little manual has been issued to govern the department. There is surprisingly little mention of automobile fire apparatus, considering that such a large fraction of the fire-fighting machines installed in New York is composed of motor-driven vehicles.

Among the rules specifically directed at the automobile apparatus are the following:

In section 34 it is ordered that the company commander shall ride alongside the chauffeur. Section 75 provides for special reports as to the effect of inferior gasoline upon motors. Section 112 forbids any member of the department to ride in an automobile not the property of the department and requires all members to prevent any person not a member of the department from riding on a department automobile.

Several of the rules provide for maintaining and caring for motor apparatus, but there is nothing different in their language than in that applied to the horse-drawn engines.

The department is organized under the new rules as a military body with Commissioner Joseph Johnson as honorary colonel and Chief Kenlon as colonel commanding.

Canadians After Car Smugglers

MONTREAL, Aug. 1.—Wholesale smuggling of automobiles between the United States and Canada has been going on this summer, and the Canadian customs officials have already punished several offenders, while the Canadian manufacturers are bitterly protesting against American-made cars being brought into Canada without payment of duty.

Naturally the majority of dealers in the city who represent United States firms either deny the charge or refuse to discuss it at all; but the fact remains that a special customs officer has had a busy time of it all summer working up evidence upon which seizure could be made, and at least one agent, who is interested in a Canadian make of car, admits it.

"It is simply a question of some of the United States automobile manufacturers getting even with some of the Canadian fur and clothing manufacturers who for years have sold goods to the United States visitors with the understanding that they are to

Calendar of Coming Events

What the Months Ahead Have in Store for the Automobilst—Shows, Conventions, Race Meets, Etc.

American and Foreign Fixtures of Importance Set Down in Chronological Order

Shows, Conventions, Etc.

- Sept. 17-20.....Denver, Col., Convention International Association of Fire Engineers.
- Sept. 23-Oct. 3....New York City, Rubber Show, Grand Central Palace.
- Dec. 7-22.....Paris, France, Paris Automobile Show, Grand Palais.
- Jan. 4-11.....Cleveland, O., Annual Automobile Show.
- Jan. 11-25, 1913...New York City, Thirteenth Annual Show, Madison Square Garden and Grand Central Palace, Automobile Board of Trade.
- Jan. 20-25.....Philadelphia, Pa., Annual Automobile Show.
- Jan. 27-Feb. 1.....Detroit, Mich., Annual Automobile Show.
- Feb. 1-8.....Chicago, Ill., Annual Automobile Show.
- Feb. 10-15.....Minneapolis, Minn., Annual Automobile Show.
- Feb. 17-22.....Kansas City, Kan., Annual Automobile Show.
- Feb. 24-March 1...St. Louis, Mo., Annual Automobile Show.
- March 3-8.....Pittsburgh, Pa., Annual Automobile Show.
- March 8-15.....Boston, Mass., Annual Automobile Show.
- March 17-22.....Buffalo, N. Y., Annual Automobile Show.
- March 19-23.....Boston, Mass., Annual Truck Show.
- March 24-29.....Indianapolis, Ind., Annual Automobile Show.

Race Meets, Runs, Hill Climbs, Etc.

- Aug. 8.....Minneapolis, Minn., Annual Tour Minnesota State Automobile Association to Winnipeg.
- Aug. 8-9.....Chicago, Ill., Banta Trophy Match, Chicago Motor Club.
- Aug. 8-10.....Galveston, Tex., Beach Meet.
- Aug. 10.....Whittier, Cal., Hill Climb.
- Aug. 30-31.....Elgin, Ill., Road Races, Chicago Automobile Club and Elgin Automobile Road Racing Association.
- Sept. 1-2.....St. Louis, Mo., Track Races, Universal Exposition Company.
- Sept. 2.....Indianapolis, Ind., Speedway Meet.
- Sept. 2.....Winnipeg, Man., Track Meet.
- Sept. 3-6.....Chicago, Ill., Commercial Vehicle Reliability Run, Chicago Motor Club.
- Sept. 17.....Milwaukee, Wis., Grand Prize Race.
- Sept. 20.....Milwaukee, Wis., Wisconsin Challenge and Fabst Trophy Races.
- Sept. 21.....Milwaukee, Wis., Vanderbilt Cup Race.
- Sept.Washington, D. C., Reliability Run, Automobile Club of Washington.
- Oct. 7-11.....Chicago, Ill., Reliability Run, Chicago Motor Club.
- Oct. 12.....Salem, N. H., Track Meet, Rockingham Park.
- Nov. 6.....Shreveport, La., Track Meet, Shreveport Automobile Club.

Foreign.

- Sept. 26-Oct. 6....Bourges, France, Agricultural Motor Car Exposition.
- Nov. 8-16.....London, England, Olympia Automobile Show.
- Jan. 11-22.....Brussels, Belgium, Annual Belgian Automobile Show, Centenary Palace.

be delivered into the United States without paying duty," said he.

"To deliver an automobile free of duty is a big thing, for the duty upon autos from the United States amounts to about one third of their value. Naturally leaving the question of deceiving the Government out altogether, the smuggling of automobiles is decidedly unfair to the Canadian factories."

Custom house officials decline to discuss the matter, but admit that a number of automobiles manufactured in the United States have been seized here for non-payment of duty.

The total number could not be ascertained, nor the names of the purchasers, but one customs man said "The number is very large."

It was also ascertained that while the customs people were not anxious to hold the sinners in this matter up to public opprobrium, they have, by order from headquarters in Ottawa, treated them severely, and have in each case given them the choice of losing their car or paying its equivalent in money, according to the listed price, to the Treasurer of the Dominion.

As imported cars are seldom listed under the \$1,000 mark, but more often up to the \$4,000 and \$5,000 figure, it is easy to see that the amount of seizure money climbs up pretty fast.

As another customs official said, the smuggling of automobiles is a most difficult thing to guard against on account of the tremendous length of the border line.



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231-241 West 39th Street, New York City

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A Virgin Field

TO manufacturers branching into the commercial car zone there is not any greater opportunity than that offered in the agricultural field for a gasoline tractor selling at \$1,200 or \$1,500 at the outside. Today the makers of agricultural tractors have been building for the \$2,500 field and up, and while the demand is large it is nothing compared with that for a machine at approximately half that price. A tractor selling for a little over \$1,000 has an unlimited field. Every owner of one-quarter section of land, 160 acres, and up is in the market for such a machine. They are in the market in this class because the present machine is too high-priced for their holdings.

The expansion of many agricultural tracts is so great today that motor-propelled machinery is the only solution. The people are waiting for the machine and the opportunity is offered as never before: The missionary work has already been done. For years the builders of steam engines catered to the agricultural field, but in a very limited sphere because of the excessive weight of the product. For a decade the gasoline engine maker has been exploiting this fruitful territory; and for several seasons the interest has been sufficiently great to promote annual contests for the education of the agriculturists and greatly to the benefit of the maker. There is today a wider market for the \$1,000 tractor than there is for any type of pleasure car.

Improving Lubrication**Pressure Feed Being Used**

NEARLY every automobile maker has announced several changes in the motor lubrication for his 1913 models, and while the general plan with many of them remains unaltered there have been minor changes which indicate a feeling of uncertainty as to the adequacy of previous systems. One maker who relied on the splash system has installed a positive feed system to all of the crankshaft and connecting rod bearings; another that used a pressure feed to the crankshaft and lower connecting rods with splash to the wrist pins and cylinder walls has eliminated the splash and now feeds by pressure up the connecting rods to the wrist pins, the overflow reaching the cylinder walls. Another maker has added an interconnection between the throttle and the lubrication feed, insuring more oil to the bearings with a wider opening of the throttle and vice versa. Still another maker, who made use of baffle plates in the open ends of the cylinders, has eliminated them. A score of makers have wrestled with the problem of eliminating smoking on closed or partially closed throttle: So the program of changes proceeds, all indicating an unsettled situation, due primarily to the greater requirements on the oiling system because of higher crankshaft and piston speeds as well as increased motor efficiency. In a word, the maker has learned that when the power output of the motor has been increased by larger-diameter valves, by lighter pistons and connecting rods, by larger-diameter crankshafts, by stouter crankcase and cylinder casings, by multi-point ignition, by improvements in carburetion, there must be commensurate improvements in the oiling system, because truly it is the lubricant that keeps the motor working.

There have been several makers who for the present season overlooked the question of perspective between the lubrication system and the other systems of the car. Heretofore the lubrication one had been the acme of satisfaction and they concluded that it would continue so, but discovered an error. It lagged behind. They learned the lesson that perspective enters into every department of the motor and chiefly into the lubrication system. After discovering their error some of them added auxiliary systems, only to incorporate them into the car total at the first opportunity.

Not only have the improvements in motor design placed a heavier load on the oiling system, but municipal regulations against smoking have rendered higher efficiency imperative. This has introduced the problem of good lubrication at slow speeds, and chiefly with partially closed throttles. To handle this question called for action based on the fact that with the throttle in a partially closed position there is more of a vacuum created above the piston and consequently a stronger tendency to pull the oil up the cylinder walls past the piston and into the combustion chamber, where it is burned and passes through the exhaust system as smoke or rests as carbon in the combustion and valve chambers. Various schemes have been utilized to counteract this suction, if the expression may be used. A common one has been

the scraper groove in the piston in conjunction with holes drilled from this groove to the inside of the piston thereby setting up an equilibrium of pressure in the space beneath the piston and whatever space there remains between the piston and the cylinder wall. This has given special satisfaction in many places. The anti-smoke crusade has also brought improvements in testing the oil level in the crankcase as well as in giving greater accessibility to the drain cock of the crankcase and also the overflow cock. Both of these are now in many cars, fitted with upwardly extending handles, permitting of their operation without having to reach down to the base of the crankcase or make use of a special door in the underpan.

Extra life has been given the oil used in many motors

by the discontinuance of the splash system, which has been gaining followers each season for several years. With the big lower end of the connecting rod dipping into the oil level the lubricant was unnecessarily churned and only a very small percentage of that splash reached the desired points. The viscosity of the oil was needlessly lowered. To avoid this the trough oiling system was introduced with the small scoop on the end of the connecting rod. Even with this the adequacy was not what was at all times desired, and the next step taken by many makers was the entire elimination of the splash and the adoption of the pressure system, a trend of progress which has been carving its way in Europe for the last 5 years. It is a certainty that 1914 will witness vast strides in this direction.

S.A.E. Detroit Branch Meets

**Decides That Negotiations With Bureau of Standards Be Left to National Council—
Discuss Bearing Standards**

DETROIT, MICH., Aug. 3.—The keynote of the meeting of the Detroit Section of the Society of Automobile Engineers held on August first was the discussion of the proposed standards work to be done for the automobile industry by the Bureau of Standards at Washington. It was the general sentiment of the members of the section present that any negotiations which are to be carried on with the Bureau should be done by the national council of the Society, since the communications of this body would carry more prestige than would those of any local branch of the Society. A motion made by H. W. Alden discharging the Detroit committee which was appointed to confer with the officials of the Bureau of Standards and recommending that the work be carried on by a committee appointed by the National Council of the Society, was carried. It was also recommended that J. O. Heinze and E. J. Stoddard be placed on this national committee.

D. F. Graham, expert on bearings, stated that one thing which could be standardized to immense advantage and on which there is a wide difference of opinion is the exact size of gauges and plugs for accurate measurements. There is a difference in the manner of use of micrometers, which often results in varying ideas of the same accurate dimension. It is hard to tell just what the size of a hole or the diameter of a piece is. Standards for such measurements should all agree, and since each manufacturer can not afford to carry such a set, due to its expense, one set should be kept for the use of all.

In further discussing the subject, Mr. Heinze made the Society's position clear by stating that it should ask the Bureau of Standards to tell it only those things which it cannot find out for itself, due to the lack of apparatus for such research, or to lack of time to carry on such exhaustive tests as were necessary.

In speaking of the proposed testing laboratory in Detroit, for the joint use of all automobile manufacturers, as proposed at the summer meeting of the entire Society, Mr. Heinze stated that while some of the privately owned laboratories now existing are good, none of them are complete. If there was one which had some eminent professor in charge who was unbiased by commercial considerations, and who had all the time he needed to do his work, such a laboratory would be of great benefit. The expense of such an institution would be much less than the total cost of operating individual laboratories. The project would cost about \$100,000, and Mr. Heinze stated that unless it could be carried out as it should be, it would better be left alone.

Hub After Joy-Ride Officials

**Investigation Shows That City Spends More for
Maintenance Than Cars Cost Originally
—Municipal Garage Possible**

BOSTON, Aug. 2.—Following the discharge of Chief Clerk Casey, of the School Commission, of a charge of joy-riding in using the motor car belonging to the commission, the Boston Finance Commission has inserted its probe into the care and maintenance of the city motor cars. It was Casey's second offense, and the first time he suffered a reduction in salary of \$500 a year. It is expected that when the report of the Finance Commission is made public some startling figures will be given out and there may follow some drastic action. According to the City Auditor's books \$89,473.35 was spent during the past fiscal year on the 54 cars and trucks in the service of the city. The figures show that the Public Works department spent the larger amount, but as it has 17 cars this is not surprising.

Mayor Fitzgerald, although he has but one car, has spent \$5,494.09 for its maintenance, or more than the car cost the city new. This is nearly as large as the amount spent for the maintenance of all seven cars by the Police Department. The Mayor has just bought a new car for \$3,200. The cost of maintenance for the departments follow: Bath department, three cars, \$6,845.07; park department, four cars, \$7,781.67; health department, four cars, \$3,327.04; school department, two cars, \$4,505.48; public works department, Central office, one car, \$1,162.31; bridge and ferry division, three cars, one out of use, \$4,755.66; paving division, three cars, \$5,706.29; sanitary division, two cars, \$1,947.87; street cleaning division, two cars, \$3,981.50; sewer division, four cars, \$4,004.24; water division, three cars, \$7,989.17.

That some of the cars are used for evening and Sunday outings is well known. When the matter of joy-riding came up before the council passed an order to have all city cars marked, but this is a joke, for the cars bear little metal plates a few inches square with initials only on the sides near the running boards where they are not noticed. It is expected that following the Finance Commission's report there will be established a municipal garage where a check can be kept on all cars. Now they are kept anywhere and the chauffeurs can get them any time they want them and the officials get the cars, too, at any old time.

NEGOTIATIONS have been completed for the purchase of the E-M-F Studebaker plant at Port Huron, Mich., by the Havers Motor Car Company, which has met with much success in the building of moderate-priced six-cylinder cars. The Havers company will take immediate possession and push its plans for the greatly increased output for 1913.

London's Rubber Market

Prospects of Artificial Product Has Depressing Influence During Trade Period Ending June 30

Cheaper Rubber Does Not Necessarily Mean Cheaper Tires—Production Figures and Prices

LONDON, Aug. 1.—Plantation rubber had a cheerful effect on an otherwise dull market, considering the commercial period ending June 30. The synthetic rubber scare, as it was called, depressed rubber shares and it was on that account that a strong demand, as shown at the plantation auction of the end of June, was so cheering. The lack of stability of the rubber market is adequately reflected in the effect of the synthetic rubber announcement, which almost precipitated a panic. In the interim crude rubber is in fair demand, selling at 4s. 6 3/4 d. (\$1.13 1-2) per pound. But this showing merely indicates something of the extent to which rubber enters the arts. Those who have occasion to use rubber, if they run short, find it expedient to replenish the supply in their vaults, and when the synthetic scare struck the market, purchasing of crude was the natural order of the day. The result of this heavy buying movement was favorable to a hardening market, but there is nothing in this situation which would lead one to believe that plantation (rubber) shareholders feel very comfortable.

There are two possibilities in conjunction with the announcement of synthetic rubber, *viz.*, that plantation rubber is likely to get a severe setback, and that British tire makers are confronted by a demand for lower prices for their wares—the average Britisher still believes that the prices are high for the tires, due to the high price of crude. The more enlightened English motorists, however, point out that the percentage of actual rubber in a tire is very low. They also say: the fabric, if it is of the best grade, and the expenditure represented in the cost for skilled labor employed in tire making, coupled with a rather heavy selling propaganda, are sufficient grounds for believing that the cost of tires to motorists here will scarcely be lowered, even assuming that synthetic rubber takes hold of the market to the extent of supplanting plantation products.

It is pointed out that tire makers have but themselves to blame for the rather awkward situation which confronts them. The average man thinks that it is the high price of crude which serves as the foundation for the high price for tires. Naturally these mistaken individuals, of which there is a legion, will clamor for a reduction in the price of tires, the very minute that the cost of crude is tapered down. That they will be disappointed, is almost certain. In order to balk an awkward situation, it is claimed in some quarters that tire makers are depreciating the claim that synthetic rubber is in the nature of a great discovery.

One individual has expressed the opinion that synthetic rubber has a very high nuisance value. Whether or not the users of rubber would prefer to pay enough to suppress the production of rubber on a synthetic basis, remains to be seen.

Deep Price Cuts Not Probable

For the near future, it is claimed that the market position of Para rubber is secure. One feature which supports Para crude is the progressive consumption of rubber. One point is overlooked in the attack which is being made upon synthetic rubber by tire makers in England, *viz.*: When it is said that synthetic rubber will fall below the quality required in the manufacture of tires, no mention is made of the possibility of relieving the pressure on Para, through the simple expedient of employing synthetic rubber in the many situations which now command the use of either Para crude or seed crude *via* plantations.

There is one thing which cannot escape the notice of the market. The synthetic rubber scare is almost sure to snub plantation effort. This, in the face of a progressive demand, spells stability of Para for several years to come if synthetic rubber fails to take a strong production position in the near future. Indeed, it is quite plain that the three forces here in operation must lead to a famine of the best grades of crude. The three forces are: Increasing rate of demand, reduced plantation output, and the failure (if it does fail) of synthetic rubber to make up for the deficit. All of which, taking it for granted that Para output will hold its own, but no more.

The output of Para crude at the present time is reported statistically, about as follows:

From Brazil, for 12 months ending June 30, including Cancho, 32,360 tons. Just to show that this source of supply is not progressive, it is only necessary to state that the output from these sources was 37,565 tons and 32,140 tons respectively for the two preceding seasons.

At the end of this year (June 30) the stock of crude in hand, but not shipped, at the port of Para, was 3,050 tons. This is in the nature of an actual reduction of the Para annual hold-over of crude by some 1,500 tons as compared with last year.

The reduction in crop hold-over at Para of 1,500 tons is offset by the lower production of one of the two preceding years, whereas a progressive demand for crude is shown, not by any increase of movement in Para deliveries, but in the movement of plantation crude. In this connection it is pointed out that, if tire makers do not support the plantation market, it is then, quite evident that plantation crude enters into the other arts, relieving Para to that extent, thus enabling tire makers to monopolize Para in their more exacting requirement.

Referring specifically to plantation production of crude, it is reported from the Federated Malay States that over 542,877 acres of land are now devoted to rubber cultivation. This grand total of acreage was due to an increase of upwards of 70 per cent. increase in Malay production between 1910 and 1911, the latter being the date of the last authentic acreage report from these states.

The conditions at Ceylon are backward as compared with the progress which has been recorded for Malay. It follows, therefore, that synthetic rubber will strike the hardest blow at Ceylon. But the Ceylon planters go in for supplementary crops of tea, coffee, and cocoa. In this way expenses are kept down and the effect of a depressed rubber market will scarcely be so pronounced.

Synthetic Bogy May Scare Investors

In the Straits Settlement, if financial tinkering in London is a reflection plantation rubber is seeking additional financial support, just at a time when this support is lacking. In the same way, Kepitigalla rubber conditions are somewhat backward. The rubber output, as reported by the Kepitigalla Estates during the year ending March 31, was 90,025 pounds. But there is a certain measure of consolation in this report, due to the actual increase of 48,601 pounds for last year over the previous year. Then, too, these estates score on tea and pepper. The actual results of the combined efforts at rubber, tea, and pepper growing enabled these estates to declare a 4 per cent. dividend on the capital stock this year, this being an increase from the dividend of 2 1-2 per cent. which was declared last year. The rubber produced brought an average price of 4s. 2d. (\$1.12) at the English auction, this being low in view of the higher average price of 5s. 7 1-2d. (\$1.40) for the previous year.

It would scarcely be of interest to bring these matters of the rubber market to the attention of the average automobilist in the ordinary sense, but it is worthy of note that plantation rubber promised to serve as the balance wheel for Para, and, with a synthetic scare confronting them, it is more than likely that British investors will withdraw their support, letting plantation enterprises sink or swim as best they can. It is feared in some quarters that plantation enterprises are not sufficiently advanced to strike out, unbuoyed by outside financial aid.

New York Rubber Show

Twenty-two Nations Represented in Exposition Which Will Open Next Month in the Palace

Comparisons To Be Made of the Value of the Indigenous and the Plantation Products

UNDER the auspices of twenty-two governments, each of which will be officially represented by accredited delegates, the International Rubber and Allied Trades Exposition will open September 23 at Grand Central Palace and will remain open until October 3. Most of the twenty-two governments concerned in the undertaking are states of the British empire, South and Central American republics and territories of the United States. The list includes the following: Ceylon, Straits Settlements, Federated Malay States, British Guiana, Jamaica, Dutch Guiana, Belgium, France, States of Para and Manaos and the Republic of Brazil, Southern India, Mexico, Portugal, Honduras, Costa Rica, Indo-China, Lower Burma, Hawaii and the Philippines.

Already the booths are being prepared to house the exhibits although 6 weeks will elapse before the opening of the show.

The general plan of the expositions is comprehensive and is being carefully worked out. In the main exhibition hall of the Palace, where the automobile show was held last winter, will be installed the exhibits of rubber-making machinery and rubber manufactures. Here will be given actual demonstrations of the

The conclusions reached among the men who make it a point to see into the future of market situations, may be summed up as follows:

A—Tire makers have little to fear from any of the causes which so convulse the rubber market, due to the small percentage of actual rubber used in tire production.

B—The commercializing of synthetic rubber production will take considerable time, and, in the interim:

C—Plantation enterprises will suffer, due to lack of British financial support. In the meantime:

D—Para will remain, as it always has been, the source of fully 90 per cent. of the actual supply of quality crude.

Referring to synthetic rubber, that recently discovered compound, representative of one of nature's strange substances which, fortunately or otherwise, has strayed into the world of mechanics, the strength of its possibilities is reflected in the savage way that certain of the tire interests attack it; the best argument that they present is that synthetic rubber is another echo of an old story. In the meantime the compounding of this product has been accomplished on a definite basis.

The process seems to be capable of perfection on a commercial basis, and fortunately, the raw material required in the process is abundant in nature and low in price. In the process as it has been outlined, there is no waste products. The two outputs are (a) synthetic rubber and (b) alcohol (fuel). The synthetic rubber is in two grades—(1) of a fluid consistency, and (2) a solid residuum. The grade 1 latex, if such it may be called, is for use in the production of rubber products in the ordinary way; the grade 2 solid constituent serves as a foreign substance, so called to put into a batch of natural rubber latex, to form a tough compound, as the treads of tires, where great toughness is the prime requisite. The fuel by-product may not be of present great value, but gasoline in England is either scarce or controlled as to price; at all events it would take the acumen of a Yankee to make a purchase of gasoline at a shilling (about 25 cents). The ruling price at supply stations is variable, at over a shilling per gallon. As a rule, the retail price of gasoline in England is about double what it costs in the United States.

various processes that lie between the collection of latex to the production of automobile tires and other finished goods.

The lobby, entrance, grand stairway and even some of the pavement in front of the building will be covered with rubber to demonstrate the value of the substance in that way.

The mezzanine floor, where the commercial cars were shown last winter, will house the exhibits showing the reclaiming of rubber, compositions and chemicals.

Hawaiian Product Will Be Shown

THE floor above will be devoted to exhibits of crude rubber in various shapes and forms. Brazil will have an immense booth showing the importance of the indigenous production and close by will be the exhibit of Ceylon, depicting the condition of the plantation industry.

One of the most interesting sections of the show will be the exhibit from Hawaii. Recently the cultivation of rubber in the Hawaiian archipelago was rewarded by success and 1 ton of plantation rubber grown from seeds of the *Hevea Brasiliensis* will be shown. The industry has not made very satisfactory progress in the Philippines, having had a poor start.

Probably the most valuable and illuminating feature of the show will be the comparison that will be made of the relative value to the industry and public at large of the indigenous and plantation product. Mr. Manders called attention to the fact that the plantation rubber marketed so far this year in the regular fortnightly auctions in London is far in excess of the 1911 figures for the same period.

He looks for the maintenance at least, of the indigenous yield and consequently expects a tremendous increase in the volume of crude rubber susceptible to manufacturing uses of the industry.

Mr. Manders says that with the increase in the volume of crude rubber, thousands of things not made of rubber at present will be made of rubber then and that fully 1,000 new uses will be found for the substance.

In spite of the large additional demand, he states that he expects a gradual reduction in the price of crude because of the augmented supply from the plantations which can produce rubber at a profit at 25 cents a pound.

Doubtful as to Artificial Rubber

HE holds that synthetic rubber has made no material advance in 20 years, but that it may come eventually. In his desk at the Palace he has a bit of vulcanized synthetic rubber which he says cost \$120 a pound to make out of Russian turpentine. In appearance and resilience this bit of rubber seems like ordinary vulcanized Para. As to its values as a commercial proposition he is not enthusiastic.

"I hope it can be made on a commercial basis," said Mr. Manders, "because it might prove valuable as a mixture with gum rubber for certain uses. Every factor in the problem is important enough to deserve close study, because the discovery of an element that can serve to supply a need of the public is always important and if the mixture of synthetic rubber with natural gum will serve to release some of the present or future demand for natural gum, it will release a certain amount of crude rubber from its present uses and allow of its being used in some other direction."

During the exposition an International Rubber Congress will be in session for at least a week. The convention hall will be located on the fourth floor of the Palace above the crude rubber floor. Planters, scientists, chemists, manufacturers and others will attend the congress which will be presided over by Henry C. Pearson.

President Taft has agreed to act as patron of the exposition on account of the tremendous importance of the rubber industry to the United States. There are seventy prominent American business men on the advisory committee, including representatives of the United States and practically every republic and dependency on the western continent. A. Staines Manders, who managed the London expositions, is in charge.

BULLETIN News of the Week Condensed



The Czar of Russia inspecting the fleet of White vehicles which took part in the recent military maneuvers

WHITES Bought By Russia—Russia has bought the five White cars which went through a test arranged by the Russian Government to determine the adaptability of motor vehicles for army service in all of its branches. A reliability run of 1,960 miles over very hard roads was held, in which the pick of European cars and the five Whites entered. After a rigid examination, the White cars were found to be in perfect condition.

Ruby Chemical Company Moves—After July 15, the Ruby Chemical Company will be located at 157 West State street, Columbus, O.

White Handles Marion Advertising—Mr. W. McK. White has moved to Indianapolis, Ind., to become advertising manager of the Marion Motor Car Company.

Stratton Joins the Everett—Mr. E. Vincent Stratton has resigned as sales manager for the Packard Dealers at Albany, N. Y., to affiliate himself with the new Everett organization.

Brown Designs Motor Truck—Mr. J. Grave Brown, of Groton, N. Y., formerly chief engineer of the Monarch Roller Company, has designed a motor truck especially adapted for contractor's service.

Hupmobile in New Quarters—Frank P. Anderson, Syracuse agent of Hupmobile cars, has removed to his new location at No. 600 South Salina street, taking the garage formerly occupied by the Joseph J. McCarthy Taxicab Company.

Kelly Truck Shows Speed—A fire occurred recently at Mr. E. S. Kelly's residence, Whitehall, Pa., which is about 10 miles away from the nearest fire engine house, and was practically saved by the quick work of the Kelly truck, which made the trip in 14 minutes.

Cole Adds to Service—C. J. Corkhill, a Middle West automobile man with experience, has been appointed assistant sales manager of the Cole Motor Car Company, with headquarters at Omaha, Neb. J. R. Moler is to hold a similar position in the territory west of the Rockies, up and down the coast. His headquarters will be with the main Cole distributors, but he will do continual traveling among Cole agents. J. R. Hamilton will be associated with Mr. Moler as the west coast Cole service expert. W. B. Lacer is second Cole service expert added.

Indianapolis Tire Men Activities—The Indianapolis sales and Indiana distributing branch of the Diamond Tire Company has moved to 431-433 North Capitol avenue, Motor Row, Indianapolis. A new three-story building has also been completed at Capitol avenue and Michigan street and has been occupied by the sales branch of the Goodyear Tire Company, the Carl Fisher company, which has the agency for the Stutz and Packard, the Archey-Atkins company, distributors of the Pierce-Arrow, Detroit electric and Hudson, and the Ideal Motor Car Company.

Wheel Tax Repeal Asked—Repeal of the wheel tax on automobiles is urged by the commissioners in Washington, D. C., and W. P. Richards, assessor of the district. The officials declare the tax to be unjust and unequal in its workings, as it was imposed by Congress without request of the municipal authorities for an option as to its advisability. At present there are four charges against motor vehicles. First—an operator's permit must be obtained for which a fee of \$2 is charged; second, an identification tag is required at a cost of \$2; third, a wheel tax is assessed against all automobiles; fourth, should the automobile be a public vehicle, a special tax license is required for each vehicle not exceeding ten passengers.

Overland Enlarges Salesroom—The Northwestern Overland Company, of Minneapolis, Minn., has added to its salesroom so as to facilitate better handling of its goods.

Automobile Club May Buy—The Cincinnati Automobile Club, Cincinnati, O., is negotiating for the property known as the Williamson farm on Colerain pike near Groesback.

Paris Resigns from Olds—Rupert E. Paris, general sales manager and assistant manager of the Olds Motor works, has resigned. His resignation is to take effect September 1.

Tags for 75,000 Motors—Pennsylvania will order 75,000 license tags for the year 1913, and increase of 15,000 over the present year. The color adopted for 1913 is olive-green with white letters and figures.

Bonness Takes Miller Tire Agency—C. J. Bonness, formerly with Chancellor & Lyon, more recently with the U. S. Tire Company, has taken the agency for the Miller tires in Seattle, Wash.

Nichols Assists Percy Owen—F. W. Nichols, former manager of the Whitten-Gilmore Company, of Boston, has been made assistant to sales manager Percy Owen, of the Chalmers Motor Company, Detroit, Mich.

Schmelz is Now With Poss—W. F. Schmelz, formerly with the Detroit Steel Products Company, has been made special sales representative for the Poss Motor Car Company, with territory in Kentucky, Indiana and Ohio.

Dallas Studebaker Branch Expands—C. W. Hartman, branch manager for the Studebaker Corporation at Dallas, Texas, has had his territory extended somewhat. A subsidiary distributing point to this branch has been opened at San Antonio.

Barnesboro's Automobile Tour—The business men of Barnesboro, Pa., will conduct an automobile tour through Indiana county August 1. The purpose of the tour is to boom Barnesboro and the fourth annual street fair to be held August 12 to 19.

East Takes Olds Advertising Reins—G. L. East, former advertising manager of the Olds Motor Works of Lansing, Mich., has taken a similar position with the Amplex Motor Car Company, of Mishawaka. His headquarters will be in Chicago, however.

Bacon to Join Packers Service—Mr. Carter M. Bacon, former inspector for the American Locomotive Company of their own Alco cars, at their factory in Providence, R. I., will join the Packers service in the capacity of service department manager.

Automobile Plates for 1913—Secretary of State Lazansky has contracted for 90,500 pairs of automobile license number plates for 1913. The contract, for which bids were invited, was awarded to the Manhattan Supply Company, of New York, which furnished the plates used this year.

Utah Club Helps Transcontinentalists—The Automobile Club, of Utah, has opened a free bureau of touring information at 251 South State street, Salt Lake City, Utah. Tour-

ists are handed cards and asked to write back to the club giving road conditions and information for others following.

Getting Ohio Show Ready—Dealers in automobiles in Columbus, O., and some of the manufacturers of both pleasure cars and motor trucks are preparing to have a large exhibit at the Ohio State Fair and Columbus, O., Centennial Celebration which will be combined and will take place August 26 to 31.

Indianapolis Wants Motor Equipment—The city authorities of Indianapolis have under consideration the adoption of motor equipment in the street cleaning department, to include several motor driven sweepers and sprinklers. Concerns manufacturing such apparatus are being communicated with by the board of public works.

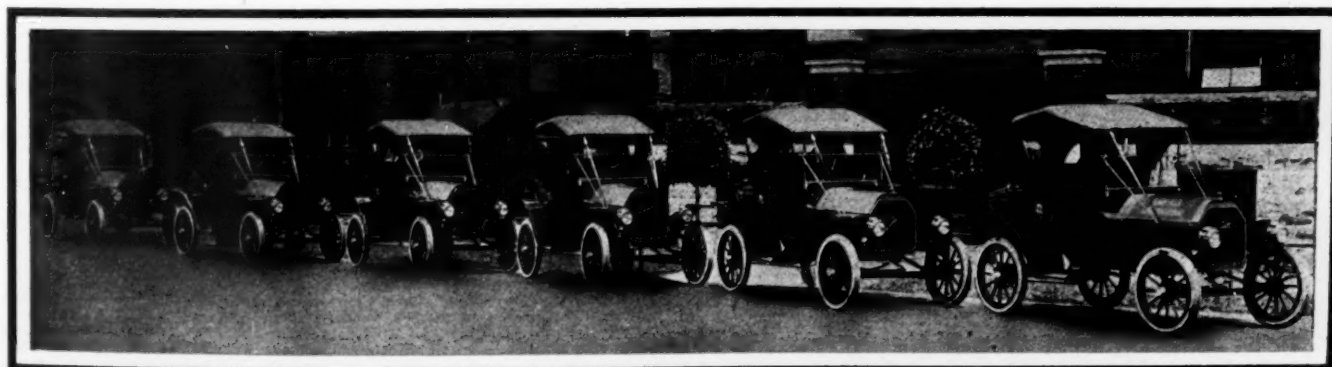
Slater Joins Mighty Michigan—The latest addition to the forces of the Michigan Buggy Company is William J. Slater, of the Firestone Tire & Rubber Company. He becomes assistant sales manager of the Michigan. Mr. Slater was advertising manager of the Firestone Tire & Rubber Company prior to coming to Kalamazoo.

Banquet at Nyberg Plant—After a parade around the city of Anderson, Ind., the employees of the Nyberg Automobile Works gathered around a banquet table in one of the large buildings of the Nyberg plant, in celebration of the splendid record made by Nyberg cars in the recent tour of Indiana-made automobiles through four states.

Yosemite Park's Bad Roads—Despite the requests of several California Congressmen, that automobiles be allowed in Yosemite Park this year, Secretary of the Interior Fisher has ordered that motor cars be not allowed in the park. The superintendent has reported that the roads are too narrow and steep for safety. Legislation is to be pushed at the next session to improve these roads.

Selling Electrics in Fleets—The Waverley Company of Indianapolis, Ind., has recently filled an order from the Louisville Lighting Company of Louisville, Ky., for six Waverley Electric roadsters for the use of the latter's trouble and repair departments. These are in addition to four light delivery wagons of the same make and for the same service. The picture on this page represents these roadsters drawn up before the Waverley office and the factory ready for shipment. The light delivery wagons will be forwarded in a later shipment.

Packard Engineering Force Developments—The engineering forces of the Packard Motor Car Company, Detroit, Mich., have been added to, J. G. Vincent having resigned as assistant engineer to Howard Coffin, of the Hudson company, to take an engineering position with the former concern. Russell Huff has been made consulting engineer and C. J. Moore manufacturing engineer, of the Packard Company. These two men, together with Mr. Vincent, will form an advisory board, which will have general supervision of the engineering affairs of the company.



Fleet of Waverley electrics now in the service of the trouble and repair departments of the Louisville Lighting Company



Four-States tourists were held up by the Gram Company

Hupp-Yeats Electric in South—Hupp-Yeats electrics will be represented in the South, A. J. Carter having been appointed southern wholesale representative.

Texas Studebaker Dealers Co-operate—The Studebaker Automobile Dealers of Texas have organized. The stated object of this organization is that the Studebaker dealers of Texas may co-operate for the further distribution of the cars in the state.

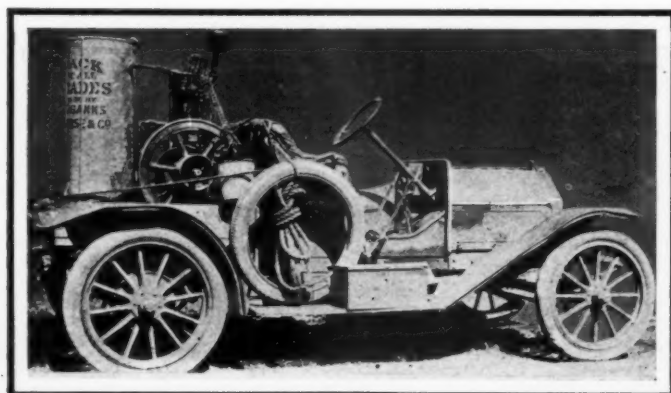
Lexington Selects Boston Quarters—The Lexington Company, of New England, has leased the building on Northampton street, Boston, formerly occupied by the Premier branch as a service station, the former company using it for the same purpose.

Clark-Carter 1913 Plans—The factory of the Clark-Carter Automobile Company, Jackson, Mich., manufacturer of Cutting cars, was recently visited by a number of dealers who inspected the plant, talked over the 1913 campaign and renewed their contracts.

Giltner Goes to Plow Maker—C. E. Giltner, who for several years has been manager of the Omaha branch of the Rambler factory, resigned August 1 to go to Moline, Ill., to become manager of the Velie automobile department of the John Deere Plow Company.

Wiles Experiment Superintendent of Velie—E. H. Wiles has accepted a position with the Velie Motor Vehicle Company, Moline, Ill., being appointed superintendent of experimental work, a department which is meeting with special attention from the Velie company.

Taxi Motor Cab Company Grows—The Taxi Motor Cab Company, of Boston, has just installed fifty new cabs, all painted light gray. They are larger than the old machines formerly used by the company, having a seating capacity of five instead of four, and electric lights to replace the oil lamps.



Studebaker 30 which replaces forty-six horses on Wyoming ranch

Baltimore Locomobile Branch Moves—The Locomobile Company, of America, Baltimore, Md., is now in its new branch house 109 to 121 West Mount Royal avenue, formerly headquarters of the Stoddard-Dayton Auto Company branch. T. W. Wilson is manager of the local branch of the Locomobile company.

Shur-Go to Make Its Starter—Announcement has been made by the Shur-Go Starter Company that it has purchased the patents and equipment required in the manufacture of its self-starter, and contemplates the manufacture of the device in New York. It is stated by the company that deliveries will be made by September 1. The officers of the new organization are: James E. Taylor, president; W. G. Rand, vice-president and general manager and E. Chamberlain, secretary and treasurer.

Automobile Incorporations

AUTOMOBILES AND PARTS

BOSTON, MASS.—Elliott Motor Engine Company; capital, \$300,000; to manufacture engines. Incorporators: G. R. Elliott, F. P. Harris.

BROOKLYN, N. Y.—Penn Automobile Company; capital, \$5,000; to engage in automobile business. Incorporators: L. Wendell, H. Partridge, M. Wolf.

BROOKLYN, N. Y.—Cold Radiating Company; capital, \$250,000; to manufacture radiators. Incorporators: F. Baker, Irene I. McCarthy, R. L. Weaver.

BUFFALO, N. Y.—Mutual Motor Car Company; capital, \$125,000; to manufacture motor cars. Incorporators: Albert Poppenberg, F. C. Carter, O. E. Yeager.

CAMBRIDGE, MASS.—Blake Automobile Company; capital, \$100,000; to engage in automobile business. Incorporators: E. C. Blake.

CAMDEN, N. J.—Service Motor Truck Company; capital, \$50,000; general automobile business. Incorporators: R. L. Smith, C. D. Hackett, E. J. Eldridge.

CEDARBURG, WIS.—A. H. Meyer Motor Car Company; capital, \$25,000; to manufacture automobiles. Incorporators: J. Armbruster, J. Dietrich, J. F. Bruss.

CINCINNATI, O.—Welbon Motor Car Company; capital, \$25,000; to manufacture automobiles. Incorporators: W. E. Welborn, H. S. Leyman, C. D. Wilson, C. W. Shepler, H. S. Welbon.

CINCINNATI, O.—Cincinnati Motor Car Company; capital, \$10,000; to manufacture automobiles. Incorporators: C. D. Wilson, H. E. Heisey, C. W. Shepler, J. C. Miller.

CINCINNATI, O.—Central Automobile Company of Kentucky; capital, \$25,000. Incorporators: W. Dickerson, G. Koehler, M. Emrich.

CLEVELAND, O.—Arter Automobile Carriage Company; capital, \$20,000; to manufacture automobiles. Incorporators: J. S. Arter, B. Hexter, J. B. Buhl, C. A. Chapman, C. B. Lammon.

COLUMBUS, O.—Central Motor Car Company; capital, \$25,000; to manufacture automobiles. Incorporators: Anna Herr and others.

DETROIT, MICH.—Ford Motor Car Company; capital, \$750,000; to manufacture automobiles.

DETROIT, MICH.—Manufacturers' Sales & Engineering Company; capital, \$1,000; to deal in automobiles.

DETROIT, MICH.—Hercules Motor Truck Selling Company; capital, \$50,000; to engage in automobile business. Incorporators: A. Smith, J. O. Murfin, W. E. Webb.

DETROIT, MICH.—Durham Easy Truck Company; capital, \$50,000; to manufacture trucks. Incorporators: J. M. M. ckey.

KANSAS CITY, MO.—Hudson Latham Company; capital, \$100,000; to manufacture motors. Incorporators: W. A. Latham, C. B. Boyd, W. M. Boyd, B. Downing.

JAMESBURG, N. Y.—Ex-Cel Motor Truck Company; capital, \$250,000; to conduct a general automobile business. Incorporators: T. C. Corwin, A. Englehart, A. A. Kelley.

NEWARK, N. J.—Sullivan Automobile Company; capital, \$25,000; to engage in a general automobile business. Incorporators: J. Sullivan, C. Bagnole, W. N. Frankel.

NEW YORK CITY.—Standard Automobile Company; capital, \$10,000; to deal in automobiles. Incorporators: E. H. Erichman, H. D. Chapin.

NEW YORK CITY.—Wallace Automobile Company; capital, \$300,000; to manufacture automobiles. Incorporators: S. E. Robertson, H. W. Davis.

RENO, NEV.—Mack Auto Company; capital, \$50,000; to engage in the automobile business. Incorporators: M. J. Mack and others.

SOUTH BEND, IND.—South Bend Auto Body Company; capital, \$20,000; to manufacture automobile bodies. Incorporators: V. E. Paxson, S. W. Nicholson, J. C. Paxson.

ST. LOUIS, MO.—Burns Ramsden Motor Car Company; capital, \$10,000; to manufacture and deal in automobiles. Incorporator: Louis N. Burns.

ST. LOUIS, MO.—Model Auto & Sales Company; capital, \$3,000; to engage in the automobile business. Incorporators: Oscar Sonntag, Roy E. Stutts, Otto F. Karbe.

TOLEDO, O.—W. H. McIntyre Company; capital, \$10,000; to engage in the automobile business. Incorporators: W. H. McIntyre, William Vollmayer, Frank Carabin, Edward Lakey, Frank Kelly.

WESTFIELD, N. J.—Darby Motor Car Company; capital, \$25,000; to engage in the automobile business. Incorporators: L. D. Darby, H. C. Darby, A. B. Darby.

GARAGES AND ACCESSORIES

AKRON, O.—Akron Airless Tire; capital, \$56,000; to manufacture punctureproof tires. Incorporators: W. S. Brooks, T. N. Thompson, F. H. Beyer, H. L. Cole.

AKRON, O.—Majestic Rubber Company; capital, \$3,000; to manufacture and deal in tires and rubber goods. Incorporators: A. L. Neiswanger, O. W. Baum, J. H. Ault, J. A. H. Myers.

BALTIMORE, MD.—Jewell Electric Company; capital, \$10,000; to manufacture electrical devices. Incorporators: J. C. M. Lucas, H. Percy Lucas, Clay Jewell.

BOSTON, MASS.—Maiden Gas & Electric Company; capital, \$15,000; to manufacture electrical devices of all kinds.

Will Inspect European Branches—W. H. Lalley, foreign sales manager of the Studebaker Corporation, will leave Detroit this week for a tour of inspection of the firm's European branches.

Australian Visits Studebaker Plant—R. E. Kemsley, Studebaker distributor for Australia, New Zealand and Tasmania, with headquarters at Melbourne, Australia, was a recent visitor to the Detroit plant.

Groff Takes Boston Paige—H. M. Groff has been sent to Boston to take charge of the New England branch of the Paige-Detroit car, and he will make his headquarters in Boston at the local agency on Hereford street.

King Appoints Canadian Agent—The King Motor Car Company has designated the Matheson Automobile Com-



New concrete building of Firestone Tire Company in St. Louis

Automobile Incorporations

BROOKLYN, N. Y.—International Auto Lamp Manufacturing Company; capital, \$300,000; to manufacture automobile lamps. Incorporators: Hyman Agar, Thomas Cunningham.

BUFFALO, N. Y.—Hall Automobile Coupler Company; capital, \$250,000; to manufacture a patent hose coupling. Incorporators: John W. Blackman, Lucius M. Hall, Edward S. Hall.

CINCINNATI, O.—Oil Industrial Company; capital, \$10,000; to deal in oils, greases, belt dressings, etc. Incorporators: E. G. Holden, John C. Rogers, Earl H. Passel, George C. Schmidt, Jr., E. R. Heisel.

CINCINNATI, O.—Swing Wheel Company; capital, \$50,000; to manufacture automobile wheels. Incorporators: Richard E. Werner, Rupert H. Langdale, C. A. Bickett, Richard A. Bickett.

CINCINNATI, O.—Victor Auto Parts Company; capital, \$20,000; to make automobile accessories. Incorporators: William J. Corcoran, Edward B. Corcoran, John L. Corcoran, Harvey R. Corcoran, H. R. Kerans.

CLEVELAND, O.—Knox Rubber & Supply Company; capital, \$10,000; to manufacture rubber goods, tires, etc. Incorporators: R. A. Lang, C. S. Wachner, H. H. Burton, A. S. Dael, P. F. Blaine.

DAYTON, O.—Automobile Lamp Control Company; capital, \$15,000; to make automatic lamp-control devices for automobiles. Incorporators: Henry Ehlen, Ernest A. Eastman, William B. Meeker.

DETROIT, MICH.—Detroit Battery & Ignition Company; capital, \$200,000; to manufacture storage batteries, automobile lighting and ignition devices, etc. Incorporators: Charles R. Baxter, Louis C. Knop, Charles L. Tomlinson.

DETROIT, MICH.—Kenyon Searchlight Company; capital, \$75,000; to manufacture searchlights and other automobile accessories. Incorporators: H. B. Kenyon, H. E. Bloomingdale, C. F. Bloomingdale.

DETROIT, MICH.—Michigan Motor Specialties Company; capital, \$20,000; to manufacture automobile accessories. Incorporators: Nellie M. Beck, Charles W. Beck, Charles Wright, Jr.

DETROIT, MICH.—Mote Demountable & Detachable Rim Company; capital, \$30,000; to manufacture rims. Incorporators: Herman Mote, H. L. Beck, W. M. Elliott.

DIXONVILLE, IND.—Anto Transportation Company; capital, \$85,000; to engage in the transfer and transportation business. Incorporators: G. W. Carr, J. H. Prescott, Thomas E. Boyd, F. Bertollette.

HUDSON, N. Y.—Warren Street Garage Company; capital, \$3,000; to engage in the garage business. Incorporators: John T. Hester, Henry B. Hester, Dennis Hester, Jr.

MIDDLETOWN, PA.—Middletown Auto Club; to advance the interest of local automobile owners. Incorporators: D. W. C. Lavery, A. H. Luckenhill, I. O. Nissley, W. P. Evans, T. M. Yost.

NASHVILLE, TENN.—City Taxicab Company; capital, \$5,500; to operate taxicabs. Incorporators: E. D. Dakin, T. O. Perkins, J. D. Andrews, W. V. Andrews, F. M. Swann.

NEW YORK CITY.—Automobile Importers Alliance; capital, \$750; to look after the interests of automobile importers. Incorporators: George J. Ginsburg, Bernard C. Wyner.

NEW YORK CITY.—Protective Auto League Company; capital, \$1,000. Incorporators: I. Fogg, D. G. Hopkins, G. W. Dillman.

NEW YORK CITY.—Wadsworth Garage, Inc.; capital, \$9,000; to conduct a garage. Incorporators: William Daly, Albert C. Christian, George A. Boyd.

PATERSON, N. J.—Paterson & New York Motor Express Company; capital, \$50,000; to conduct a general transfer and express business. Incorporators: J. M. Simpson, M. Brooks, H. Smith.

RACINE, WIS.—Faultless Starter Company; capital, \$10,000; to manufacture a self-starter. Incorporators: D. I. Shoop, Samuel Hansen, Mortimer Walker, J. Barker.

ST. LOUIS, MO.—Pugh Auto Chain Company; capital, \$5,000; to manufacture and deal in automobile chains. Incorporators: John Schulz, Webster Groves, Arville A. Van Cleave, Edward Brockschmitt.

TRENTON, N. J.—M. & M. Tire Company; capital, \$20,000; to manufacture rubber goods and tires. Incorporators: William McGinnis, Edgar W. Creese, Walter A. Wood.

WASHINGTON, D. C.—Automobile Engineering College; capital, \$5,000; to educate chauffeurs. Incorporators: Frank N. Justice, Edgar L. Turner, Thomas W. Smithfield, Garfield H. Street.

CHANGES OF NAME AND CAPITAL

CLEVELAND, O.—Cleveland Auto Starter Company; capital increased from \$25,000 to \$50,000.

DETROIT, MICH.—English Company; capital increased from \$5,000 to \$100,000.

MONROE, MICH.—Elkhart Manufacturing Company; capital increased from \$60,000 to \$110,000.

RACINE, WIS.—Racine Rubber Company; changed name to Belle City Rubber Company.

pany, of Toronto, Canada, of which Scott Innes is manager, as its sales agent for a large part of Ontario.

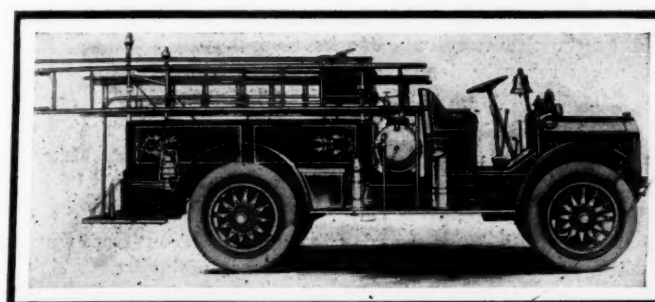
Hall Now Olds Sales Manager—J. V. Hall, formerly manager of the Oldsmobile Company, of Illinois, has been appointed general sales manager of the Olds Motor Works, of Lansing, Mich., to succeed R. E. Paris, resigned. Mr. Hall will assume his duties at Lansing on September 1.

Oakland Sales Branch in Detroit—The Oakland Motor Car Company, Pontiac, Mich., has opened a sales branch in Detroit with William R. Tracy, for the past two seasons sales manager of the Oakland Sales Company, Ltd., as its manager. J. F. Montgomery has resigned from the Bemb-Robinson Company to take a sales position with this new firm.

Preparing the Iowa Show—Iowa's big summer automobile show is only 2 weeks away. It is to be held at Des Moines as one of the features of the Iowa State fair, the last week in August, and will be installed under the great steel amphitheater at the fair grounds. The space has been entirely sold for weeks and the biggest show in the history of the state fair is expected.

Federal Builds Fire Trucks—The Federal Motor Truck Company, Detroit, has announced a new fire hose and chemical truck to meet the demand for a light and speedy vehicle. It is mounted on the Federal model D chassis, which is a 1-ton proposition. The average speed of the outfit is fixed at 22 miles an hour, and the arrangement of the apparatus has been worked out with the idea of making everything within easy reach of the operators for quick action.

Kelly Goes With Lee Tire—Charles F. U. Kelly, leading spirit in the organization of the Kelly-Racine Rubber Company, Racine, Wis., has associated himself with H. A. Field, formerly vice-president and general manager of the Hartford Rubber Works, the two of them having completed negotiations with the Lee Tire & Rubber Company, Conshohocken, Pa., to market the entire product of this concern consisting of tire casings, tire tubes and automobile accessories.



Kelly chemical wagon loaned to the Springfield, O., fire department

Factory Miscellany



Plant of the Keeton Motor Company, at Wyandotte, Mich., to be devoted to the making of six-cylinder cars

KEETON Buys Seitz Factory—The plant of the Seitz Automobile & Transmission Company, Wyandotte, Mich., has been acquired by the Keeton Motor Company. The building, which is shown on this page, will be equipped by the purchaser for the manufacture of six-cylinder cars.

Austin to Build Factory—The Austin Automobile Company, Grand Rapids, Mich., has bought 6 acres of land upon which it will soon erect a factory.

Kisselkar Plant Being Increased—The Kissel Motor Car Company, Hartford, Wis., has just begun the erection of an addition to its automobile factory.

Chalmers to Add to Plant—An addition to the Chalmers factory is being planned, which is to enable the company to cope with the growing demand of cars.

Longstreth Company Negotiating for Plant—The Longstreth Motor Car Company, Philadelphia, Pa., has opened negotiations for a building at 2126 Market street.

Canadian Factory Being Built—A contract for the construction of an Amherst, N. S., factory of the Nova Scotia Carriage & Motor Company has been awarded to a firm of contractors of that town.

Stewart Iron Works Resurrection—The burned-down plant of the Stewart Iron Works Company, Cincinnati, O., which was recently destroyed by fire, will be replaced by a new structure having 100 by 415 feet floor space.

Toronto Gets New Factory—A new factory for Toronto, Ont., will be erected in the near future by the Russell Motor Car Company on North Keele street. The building will be of reinforced concrete and cost approximately \$75,000.

Parr Company Buys Land—The Parr Wagon Company, South Greensburg, Pa., has bought 3 acres of land on which stands a large factory building. The company will soon begin to manufacture trucks and automobiles in the new plant.

Clark Brothers Rebuild Plant—Clark Brothers, whose factory at Belmont, N. Y., was burned recently, have completed their plans for the erection of a new factory which will comprise two steel-and-concrete structures covering 100 by 300 feet each.

Buick Plant Bought by Jackson—The Jackson Automobile Company, Jackson, Mich., is said to have acquired the plant of the Buick Motor Company located in that city. This deal places the Jackson concern in the possession of two modern factories in the same city.

Corcoran to Manufacture Accessories—The manufacture of tools and accessories is the object of the Corcoran Manufacturing Company, Cincinnati, O. The company has leased a five-story plant at Second and Elm streets, which will soon be equipped so that manufacturing operation may be started.

Overland Factory Is Improved—Improvements, the cost of which aggregates about \$45,000, were begun last week in the Willys-Overland Company's plant at Toledo, O. The changes comprise a new blacksmith shop and an addition to the repair shop. The A. Bentley & Sons Company has received the contract for the work.

Leech Company Will Manufacture—A new type of gasoline engine will soon be manufactured by the Leech Automobile Company, Lima, O., a newly founded \$100,000 corporation.

Long Has Factory Constructed—The contracts for the erection of a \$50,000 factory of automobile parts has been given out by the Long Manufacturing Company, Detroit, Mich.

Lumen Factory Being Enlarged—An addition to the factory of the Lumen Bearing Company, Buffalo, N. Y., is under way. The company at present has a manufacturing floor space of 70,000 square feet and the addition now planned will comprise a two-story machine shop, which will make the firm's plant one of the largest establishments of its kind in this country.

New Agencies Established During the Week

PLEASURE CARS

Place	Car	Agent
Albany, N. Y.	R-C-H	James N. Kemp Mach. Wks.
Almont, Mich.	R-C-H	Chas. B. Scully.
Atchison, Kan.	R-C-H	George C. King.
Baltimore, Md.	Cartercar	Winterson Auto Co.
Baltimore, Md.	Marathon	Marathon Motor Sales Co.
Baltimore, Md.	Stoddard-Dayton	H. Block.
Baltimore, Md.	White	White Automobile Co.
Bessie, Okla.	R-C-H	Bessie Mercantile Co.
Bloomington, Ill.	R-C-H	J. E. Hatfield.
Booneville, Mo.	R-C-H	H. E. Sombart & Son.
Boston, Mass.	American	Roberts & Sherborne.
Brockton, Mass.	R-C-H	Wm. F. Holmes.
Brookhaven, Miss.	R-C-H	J. W. Day.
Buffalo, N. Y.	Marathon	Mutual Motor Car Co.
Buffalo, N. Y.	Paige-Detroit	Barrett Motor Car Co.
Buffalo, N. Y.	R-C-H	A. Judson Wells.
California, Mo.	R-C-H	O. E. Houser.
Caseville, Mich.	R-C-H	C. Crawford & Son.
Chagrin Falls, O.	R-C-H	Carl W. Patch.
Chicago, Ill.	R-C-H	John Rehm.
Chicago, Ill.	R-C-H	A. Vincent & Sons Co.
Cleveland, O.	Apperson	Eiseman Automobile Co.
Colorado Springs, Col.	R-C-H	Russell Gates Mercantile Co.
Crown Point, Ind.	R-C-H	Meeker & Claussen.
Dallas, Tex.	Chalmers	Half Co.
Des Moines, Ia.	Locomobile	Iowa Auto & Supply Co.
Des Moines, Ia.	Petrel	Geo. F. Lichty.
Fort Plain, N. Y.	R-C-H	Philip Marsh.
Fort Wayne, Ind.	R-C-H	Randall Motor Car Co.
Greencastle, Pa.	R-C-H	Petrie & Morganthall.
Hugo, Okla.	R-C-H	George W. Chandler.
Le Sueur, Center, Minn.	R-C-H	Louis Prehal.
Los Angeles, Cal.	Moline	Ben-Rick Auto Co.
Lumberton, Miss.	R-C-H	Hinton & Byrd.
Lynn, Mass.	R-C-H	C. E. Whitten.
Macon, Mo.	Moon	Macon Garage Co.
McCool, Ind.	R-C-H	Robbins & Johnson.
Milbank, S. D.	R-C-H	Farley Auto Co.
Minerva, O.	R-C-H	Minerva Hardware Mfg. Co.
Morgan, Minn.	R-C-H	Geo. H. Thompson.
New Orleans, La.	Hudson	H. A. Testard.
New Richmond, Wis.	R-C-H	Bell & Webster.
New Ulm, Minn.	R-C-H	Meuller & Aab.
Omaha, Neb.	Little Four	Doty & Hathway.
Peotone, Ill.	R-C-H	Hennry Koenning.
Pittsburg, Kan.	R-C-H	James Jepson.
Pittsfield, Mass.	R-C-H	Louis L. Lourouche.

PLEASURE CARS

Place	Car	Agent
Pleasanton, Kan.	R-C-H	Arthur L. Thomas.
Plymouth, Pa.	R-C-H	Frank Martz.
Pomona, Cal.	R-C-H	T. Clark.
Portland, Ore.	Briggs-Detroit	H. L. Keats.
Red Lake Falls, Minn.	R-C-H	Findeisen Auto Co.
Rosenberg, Tex.	Moon	Rosenberg Motor Car Co.
Richmond, Va.	R-C-H	W. C. Smith & Co.
Salem, Mass.	R-C-H	Motor Sales & Service Co.
Salem, Va.	R-C-H	M. L. Shanks.
Seattle, Wash.	Detroit	Olympic Motor Car Co.
Seattle, Wash.	Franklin	W. A. Wicks.
Shreveport, La.	R-C-H	Orme Mot. & Transfer Co.
Sioux City, Ia.	Moon	Bennett Automobile Sup. Co.
St. Clair, Pa.	R-C-H	S. H. Daddow.
St. Louis, Mo.	Cartercar	Cochrane Motor Sales Co.
St. Louis, Mo.	Henderson	Model Automobile Sales Co.
Syracuse, N. Y.	Haynes	A. E. Wheeler.
Syracuse, N. Y.	Little Four	James Automobile Co.
Syracuse, N. Y.	Stoddard-Dayton	A. E. Wheeler.
Syracuse, N. Y.	Vellie	Ferdinand Crosby.
Toledo, O.	Michigan	Ford Bros. Auto Sales Co.
Washington, D. C.	Pierce-Arrow	Foss-Hughes Co.
Washington, D. C.	R-C-H	G. R. Cowie Co.
Watertown, S. D.	R-C-H	Wolf Auto Co.
Webb City, Mo.	R-C-H	M. H. Wood & Co.
West Chester, Pa.	R-C-H	Geo. J. Moses.
Wheaton, Ill.	R-C-H	E. M. Ferry.
Wilkes-Barre, Pa.	White	Frank Martz.
Wilmington, Del.	Columbia	F. W. Ayers.
Wilmington, Del.	Maxwell	F. W. Ayers.
Wilmington, Del.	Stoddard-Dayton	F. W. Ayers.

COMMERCIAL VEHICLES

Cincinnati, O.	Universal	Payne Brothers.
Cleveland, O.	Hatfield	A. W. Hall Automobile Co.
Cleveland, O.	Sanford	W. H. Atkinson.
Dallas, Tex.	Mack	Half Co.
Dallas, Tex.	Saurer	Half Co.
New York City, N. Y.	Stegeman	American Marion Sales Co.
St. Louis, Mo.	Universal	Lindsay Motor Car Co.
Syracuse, N. Y.	Grand	A. E. Wheeler.
Tokio, Japan.	Federal	Futabaya & Co.

ELECTRIC CARS

Dallas, Tex.	Flanders	Half Co.
St. Louis, Mo.	Detroit	Detroit Electric Car Agency.

Minneapolis Republic Company Will Build—The Republic Motor Company, of Minneapolis, Minn., has secured a site for a factory building to be erected in the near future.

Geneva Supply Factory Building—Karlsene & Skarin, Geneva, Ill., are getting ready to construct a factory building, 50 by 65 feet, where automobile supplies will be manufactured.

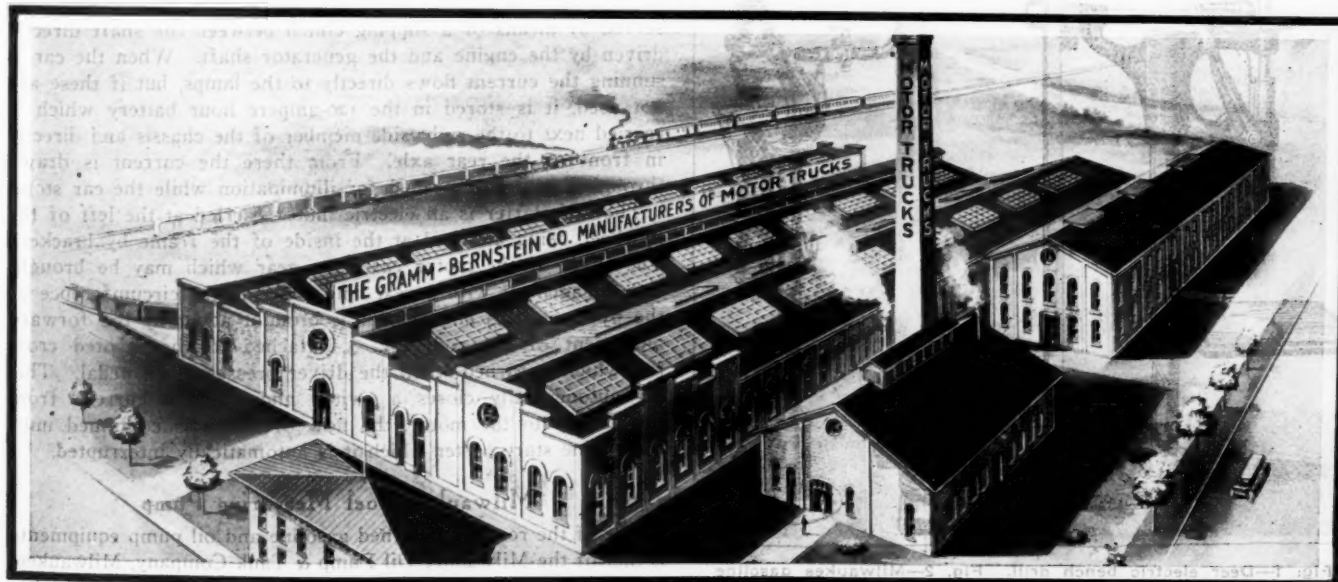
Ford Minneapolis Plant Being Rushed—Kees & Colburn, the Minneapolis architects who have received the contract for the erection of a factory of the Ford Motor Company, are making haste in preparing the plans for this work.

Cutting Factory Increases Capacity—The Clark-Carter

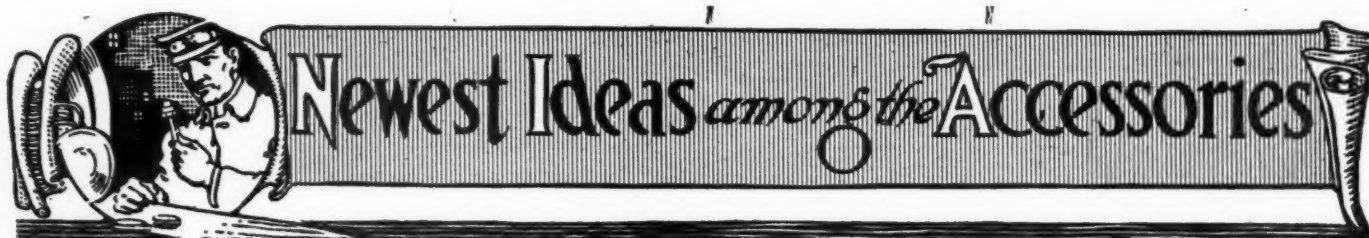
Automobile Company, Jackson, Mich., has now almost completed a four-story addition to its present plant, which will enable it to considerably increase its output for 1913.

Harris to Build Wheels—The mill building at the junction of Union street and Payson avenue, Easthampton, Mass., owned by Dibble & Warner, has been purchased by Charles Harris, who is to use it in which to manufacture automobile wheels.

Fitchburg Seeks Durant's Factory—R. D. Redfern, industrial secretary of the Fitchburg, Mass., Board of Trade, has got into communication with W. C. Durant, who is the head of the Republic Motor Company, and has made him an offer to establish one of the company's plants in that city.



New plant of the Gramm-Bernstein Company which makes motor trucks, at Lima, Ohio



Electric Bench Drill; Explosion-Proof Garage Heater; Powerful Self-Starter; Gasoline Equipment; Economic Electric Headlight; Rear View Mirror; Floorboard Material; Spring Shock Absorber; Lamp Lighter; Enriches Gasoline

Deer Electric Bench Drill

AN electric bench drill having an 8 1-4 by 10 1-2 table is made by the A. J. Deer Company, Hornell, N. Y. The drill, Fig. 1, is a simple design and all its moving parts are made of high-speed tool steel. The vertical movement of the drilling spindle is 2 1-4 inches and the space of vertical adjustment of the table 8 3-4 inches. From the center of the spindle to the column it is 5 1-4 inches, and from chuck to table 8 3-4 inches. The drill capacity of the machine is 1-4 inch. It may be operated at five different speeds, being driven by either an alternating or direct-current motor using 110-220 volt current. The net weight of the drill without the motor is 120 pounds.

Scientific Garage Heater

The Scientific Heater Company, 2123 East Second street, Cleveland, O., manufactures a small and safe garage heater which, when once lighted, serves an establishment throughout a season without requiring any further care. The device, Fig. 7, is square in shape, 39 inches long, 38 inches high and 12 1-2 inches wide; it is preferably attached to the wall and can be located at any suitable height. The fuel for the garage heater is city gas or natural gas. To start the heater the fire door, so-called, is opened and a match applied to pilot light. Then the fire door is closed and by turning a valve the gas is admitted to the burner, where it is ignited. The necessary air is now drawn in through a close wire-mesh screen which insures the safety of the lamp in the same way as it guarantees that of a Davy lamp used by miners.

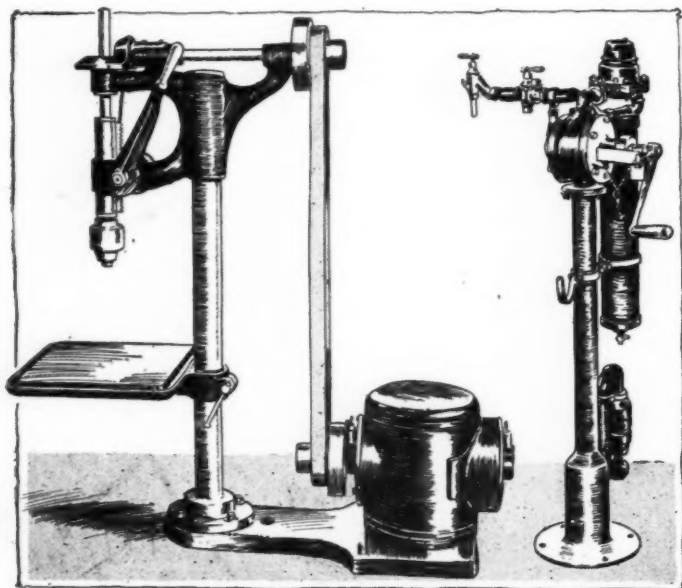


Fig. 1—Deer electric bench drill. Fig. 2—Milwaukee gasoline measuring pump

Peerless Electric Self-Starter

The Peerless Motor Car Company, Cleveland, O., is equipping its 1913 product with a complete electric starting and lighting system made by Gray & Davis, Boston, Mass. The lighting generator of this system, which also produces the current used afterward for starting the engine, is mounted adjacent to the engine and is driven therefrom at constant speed which is pre-

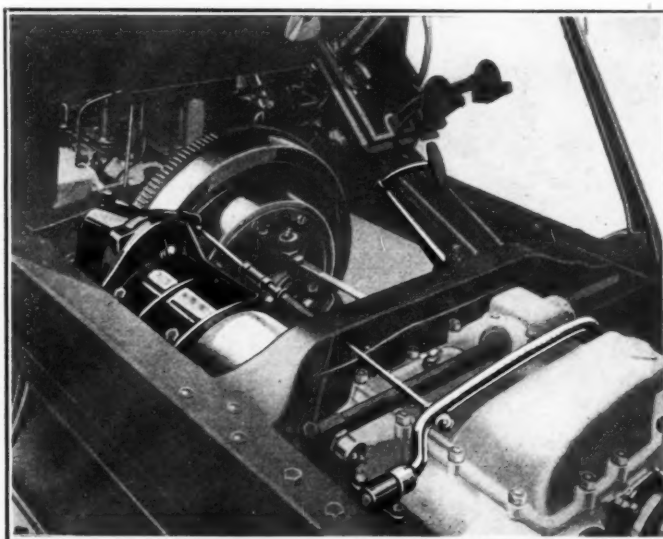


Fig. 3—Gray & Davis self-starter with which 1913 Peerless cars are fitted

served by means of a slipping clutch between the shaft directly driven by the engine and the generator shaft. When the car is running the current flows directly to the lamps, but if these are not used, it is stored in the 120-ampere hour battery which is carried next to the right side member of the chassis and directly in front of the rear axle. From there the current is drawn through a switch if needed for illumination while the car stops.

The self-starter is an electric motor carried at the left of the flywheel, being attached at the inside of the frame by brackets. The shaft of the motor carries a gear which may be brought into engagement with a gear ring covering the circumference of the flywheel; this engagement is brought about by the forward movement of the rod, Fig. 3, attached to the pivoted cross rail which is turned when the driver presses down pedal. This act automatically closes a switch and sends a current from the battery to the motor, the flow of which is continued until the engine starts, after which it is automatically interrupted.

Milwaukee Fuel Measuring Pump

One of the recently designed gasoline and oil pump equipments is that of the Milwaukee Oil Pump & Tank Company, Milwaukee, Wis., Fig. 2. This outfit consists of a measuring pump and a

tank; the pump is of the plunger type, but no leather washers or valves are used inside the pump cylinder. All the working parts are made of bronze. The pump may also be used for the handling of thick liquids such as varnish; it is furnished with a seamless steel tank. Furthermore the equipment ordinarily includes a filter, meter and nozzle, which, however, may be omitted if the purchaser so desires.

New Automobile Mazda Lamp

The General Electric Company, Schenectady, N. Y., has just put on the market a new type of Mazda lamp specially designed for automobile headlights. This lamp, Fig. 4, has a tungsten filament formed in a coil without an anchor, making it very compact and strong and sending out all the light from a very small space, so that the total volume of rays may be brought into the focus of a parabolic lamp. The lamp is made in sizes ranging from 9 to 24 candlepower. It is claimed that this lamp gives over twice as much light as a carbon lamp consuming the same amount of current.

The Eclipse Rear View Mirror

A new model of the Eclipse rear view mirror, made by the Eclipse Specialty Company, 250 West Fifty-fourth street, New York City, is shown in Fig. 5. While the shape and appearance of the mirror remain the same as formerly, the method of at-

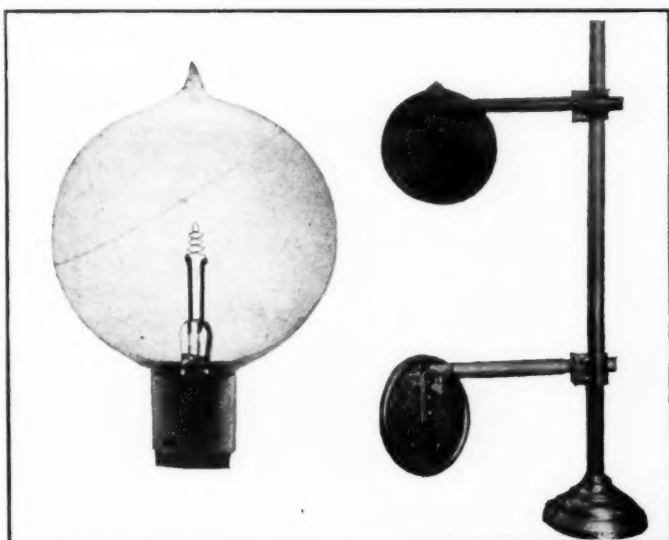


Fig. 4—G. E. Mazda automobile headlight. Fig. 5—Eclipse rear-view mirror

tachment has been modified and improved. Instead of using the ball-and-socket joint of the old model, the new type uses a bracket which is clamped by a thumb screw to a horizontal rod which is turnable around its axis and around the vertical support to which it is attached. The mirror comes in brass, nickel and black finish.

Acetrol Fuel Enriching Mixture

Utilizing the solubility of acetylene in acetone, which is used in filling gas tanks, the Acetrol Manufacturing Company, Milwaukee, Wis., has put on the market a mixture which is said to considerably increase the fuel value of gasoline, if 1 pint of it is mixed with about 16 gallons of gasoline.

Goodnow Gasoline Tank Gauge

A gasoline gauge of the stick type is being marketed by the Goodnow Manufacturing Company, 754 Old South Building, Boston, Mass. The gauge is a black stick of square section, upon which twenty brass markers are slidably arranged. Each marker carries a number, ranging from 1 to 20, and by filling the gasoline in a tank gallon by gallon and adjusting the gauge to the varying level of the fuel in the tank, the gauge may be used for any

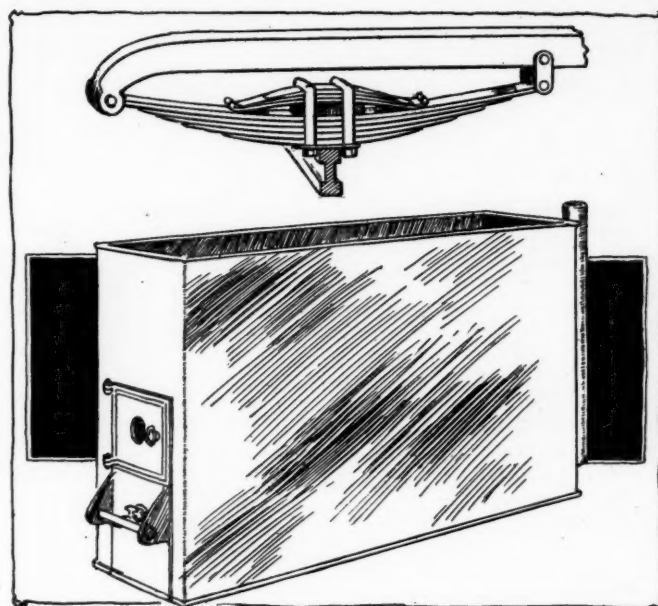


Fig. 6—Ames spring shock absorber. Fig. 7—Scientific safety garage heater

shape of container, be it square, oval or irregular. The gauge is also made with thirty markers for the use in connection with specially deep tanks.

Corubia Acetylene Lamp Lighter

To light acetylene lamps without the use of matches or batteries and spark coils, the Corubia Manufacturing Company, 71 Third avenue, New York City, now makes a small burner to which a self-lighting device is attached. The latter consists of a stem in the top of which a hard-steel gear is pivoted which is in contact with the lava arm of the burner. The lower end of the stem carries a round plate and the steel gear is held in its highest possible position by the tension of a small spring wound around the above-mentioned stem. If the plate at the end of the stem is pressed downward, the friction between steel and lava results in a series of sparks which are directed in the center of the burner space, where they ignite the acetylene coming from the tank. When the plate is released the steel gear returns again to its normal position and is then ready for the next application.

Ames Leaf-Spring Shock Absorber

To check the rebound of the lower leaves of elliptic springs the Ames shock absorber, made by O. B. Ames, Brewster, N. Y., has been designed. It consists of a small three-leaf spring attached to the elliptic spring by a double U-clip, Fig. 6; a rubber cushion is inserted between the two springs. This arrangement does not limit the free movement of the main spring as long as only moderate road inequalities are encountered but when the car strikes a bump or thank-you-ma'am the small spring counteracts the excessive movement of the large one as well as its sudden rebound, thereby adding to the life of the spring proper.

Adamat Composition Floorboard

The Flintkote Mfg. Co., New York City, maker of waterproofing specialties, is now in the market with a new product, Adamat, which is a composition flooring material. It consists of a water and fireproof body which is covered, on both sides, with a comparatively thick, rubber-like skin. The material does not absorb or permit the passage through it of a drop of moisture and is claimed to be unaffected by ordinary gases and fumes. Since both sides are prepared with the same finish and color, the material may be turned around when one side is worn. Adamat is made in red and black, coming in 36- and 72-inch width in the red material, and 36 inches in the black one.



Patents Gone to Issue

FENDER for Motor Vehicles—Being a design on which the fender is turned when the front wheels are moved laterally by the steering gear action.

This patent refers to the construction of a fender, Fig. 3. Brackets are clamped to the steering gear and have longitudinally slotted standards rotatably fastened to them. To the standards a fender is secured projecting beyond the wheel.

No. 1,033,750—to Albertus Tift, Deer Harbor, Wash. Granted July 23, 1912; filed August 8, 1911.

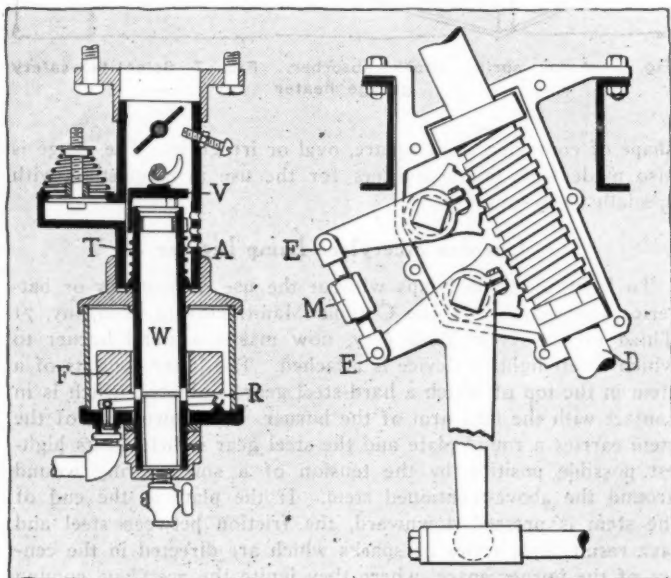


Fig. 1—Morris-Merritt wick-feed carburetor. Fig. 2—Moore steering gear

Lock Nut—Being the combination of a nut and lock washer, which latter is a resilient plate.

The lock washer W, Fig. 4, is a resilient plate, folded around a nut, with three parallel corrugations; it has rounded channels and crests permitting the corrugations to yield under

pressure, thereby securing a lateral sliding action which is accompanied by a spring resistance between the washer and the parts between which it is clamped. The intermediate corrugations have a bolt opening with an inward lug adapted to engage a bolt groove G.

No. 1,033,759—to Granville A. Humason, Shreveport, La. Granted July 23, 1912; filed April 26, 1910.

Shock Absorber and Spring—A design combining the functions of these two members, which is held to axle and body.

In Fig. 5 is shown the subject-matter of this patent, which comprises upper and lower spring-retaining plates P1 and P2 plates and an intermediate body-retaining plate B, between which springs are positioned in the following manner: The plates have on their edges annular flanges which serve to brace and strengthen them and are connected by bolts C. Spring-receiving sockets S are arranged on the plates around the bolts, and coiled springs surround the bolts.

No. 1,033,657—to Julian Seay Bashaw, Gainesville, Fla. Granted July 23, 1912; filed April 11, 1911.

Wick-Feed Carburetor—In which the normal air intake surrounds a wick the end of which is submerged in the fuel.

The subject-matter of this patent, a wick-feed carburetor, is shown in Fig. 1; it consists of a fuel reservoir R containing a float F for controlling the admission of fuel thereto. Above the reservoir an air chamber A with air openings is placed, and a vertical tube T is so stationed that its upper, open end is within the air chamber, while the lower end is in the reservoir R. A wick W is located in the tube T, and its lower end is immersed in the fuel in R, the upper end being in the chamber A and tube is adapted to be closed by a valve V.

No. 1,033,443—to Charles A. Morris and Walter H. Merritt, Red Bank, N. J. Granted July 23, 1912; filed March 27, 1911.

Steering Gear Mechanism—In which two or more gears or sections engage the steering worm.

This patent refers to a steering gear, Fig. 5, consisting of a worm D which is engaged by two or more pivotally mounted members D, which may be of the gear or sector type. These members engage the worm oppositely at different threads.

No. 1,033,442—to Van Zandt M. Moore, Cleveland, O. Granted July 23, 1912; filed March 15, 1911.

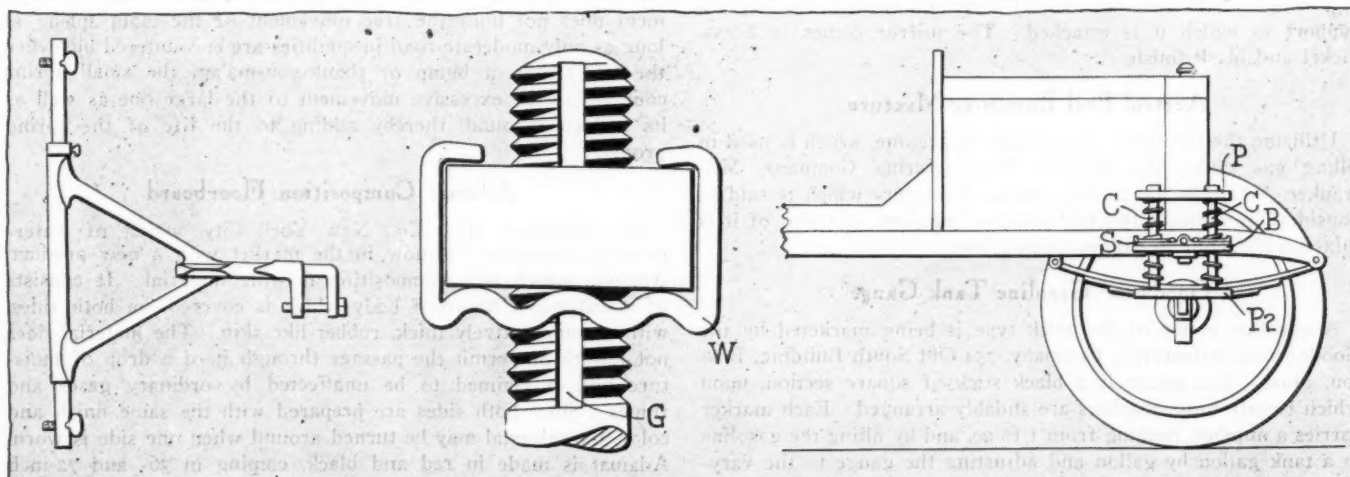


Fig. 3—Tift automobile fender. Fig. 4—Humason nut and lock washer. Fig. 5—Bashaw spring and shock absorber